

**Department of
Primary Industries
Queensland Government**

**ANNUAL REPORT
1986-87**



Department of Primary Industries Queensland Government

ANNUAL REPORT 1986-87



Presented to Parliament by Command.

Contents

- 2 Milestones
- 3 Foreword
- 4 The year reviewed
- 11 Finance
- 12 Primary industries overview
- 18 Animal industry highlights
- 23 Dairy industry highlights
- 26 Plant industry highlights
- 31 Land management highlights
- 35 Fisheries highlights
- 38 Food research highlights
- 40 Marketing and economics highlights
- 44 Legislation
- 45 Acts and Regulations
- 47 Organisation
- 47 Role
- 48 Research
- 49 Problem identification
- 49 Extension
- 52 Regulation



ISSN 0480-9696

76568—A. 31—1987

Milestones

- 1887** The Minister for Public Lands, Mr C. B. Dutton, M.L.A., becomes the first Minister responsible for the Department of Agriculture (founded on 17 June).
- 1889-96** 'Travelling dairies'—the Department's first exercise in programmed extension—demonstrate better methods of making cheese and butter to farmers, helping establish Queensland's dairy industry.
- 1897** Responsibility for the Stock Branch, set up in the Colonial Secretary's Department in 1868, and for the Stock Institute, formed in 1893, is transferred to the Minister for Agriculture, Mr A. J. Thynne, M.L.C.
The Department's prime extension publication, the *Queensland Agricultural Journal*, is published for the first time.
The Queensland Agricultural College is set up at Gatton to educate the State's future farmers.
The first two of seven State Farms (forerunners of today's research stations) are opened to identify the crops and farming systems suited to various districts in Queensland.
- 1898** To ensure the sale of high-quality meat, butcher-shop inspections begin and butcher-shop design and sanitation are regulated.
- 1904** The Department of Agriculture and Stock is formed by amalgamating the previous Department of Agriculture and the Stock Branch.
- 1905** The first steps are taken to set standards, lay down regulations and authorise inspections for seed and fertilisers.
- 1910** The Stock Experiment Station is set up at Yeerongpilly, a Brisbane suburb. Now the Animal Research Institute, it is a major Departmental research and laboratory complex.
- 1920** The first of many marketing acts, *The Wheat Pool Act of 1920*, becomes the first piece of legislation enacted in the world to set up a statutory scheme for the cooperative marketing of primary produce.
- 1921** The Department offers the first Queensland-bred wheat varieties to farmers, the outcome of a vigorous wheat-breeding programme that continues to this day.
- 1935** The Department becomes involved in soil conservation, with Mr A. F. Skinner, an agricultural adviser, building Queensland's first contour banks near Toowoomba.
- 1946** The Department begins establishing its network of research stations, which had been closed during the 1930s Depression.
- 1955** The Department introduces its artificial insemination services to assist controlled breeding programmes in the stock industries.
- 1961** The Department begins a programme that, by 1967, eradicates contagious bovine pleuropneumonia from Queensland cattle herds.
- 1963** A new name is given to the Department: the Queensland Department of Primary Industries.
- 1970** Participation in the national cattle brucellosis and tuberculosis programme begins.
- 1972** A formal system of coordinated extension is established to help make the Department's district extension services more effective.
- 1980** The Queensland Fisheries Service is transferred from the Department of Harbours and Marine.
- 1986** QDPINET, the Department's independent State-wide computer network, is set up.
- 1987** The Minister for Primary Industries, Mr Neville Harper, M.L.A., launches the Department's Centenary Year programme.

Foreword

The Department of Primary Industries celebrated its century of service to the people of Queensland on 17 June this year. During those one hundred years, my Department has achieved an enviable record in helping develop Queensland's food and fibre resources.

Through the cooperation of primary producers and service organisations (of which my Department is the largest in the State), Queensland exports more rural produce than any other Australian State. In 1986-87, our exports were worth \$3,206 million, a most significant contribution to Australia's economy by way of export earnings.

Over the years, the tremendous growth in Queensland's primary industries resulted in an expansion of the responsibilities of the Department now called 'Primary Industries'. Its goal, however, remained basically the same; that is, to foster and help develop Queensland's rural industries while conserving the State's natural resources for the use of future generations.

To achieve this goal, my Department has maintained a coordinated approach of research, extension and regulation to meet the ever-changing needs of primary producers and consumers. The dedication of Departmental officers to this task has been significant throughout the years.

As shown in this report, they have been involved at all levels of primary production, from offering advice on how to grow animals and plants and how to process produce, to assisting with marketing negotiations and working to protect consumers by ensuring the quality of food and fibre products.

During the last financial year, economic problems have been a major concern of primary producers. The Queensland Government, through my Department, has played its part in helping to alleviate these problems by continuing existing services and implementing several new initiatives.

In reaching for the future, we have not forgotten the important lessons of the past. On the marketing scene, where we established the world's first statutory marketing scheme in 1925 (for wheat), officers appointed to grower-controlled marketing boards continue to assist with the responsibilities of those boards.

The establishment of a new Horticultural Export Council is an initiative to further boost exports. Another initiative was the appointment of special financial counsellors in key agricultural districts to offer individual advice to primary producers in financial distress.

This report reflects my Department's proven innovative ability to help in the development of solutions for the changing problems facing primary producers and consumers.

As we begin our second century of service to the people of Queensland, the community, indeed the world community, may be assured of our continuing efforts to expand the horizons of agriculture in this State to meet the challenges facing further development of our food and fibre resources.

I have pleasure in presenting this annual report, which highlights my Department's activities during 1986-87.



A handwritten signature in dark ink, reading "N. J. Harper". The signature is written in a cursive style and is positioned above a horizontal line.

**The Honourable
N. J. Harper, M.L.A.,
Minister for
Primary Industries**



The year reviewed



Dr G. I. Alexander,
Director-General



'Helping Queensland Grow 1887-1987': the commemorative poster that the DPI produced for use during its Centenary Year.



The DPI used this poster to promote its highly successful film, *The Farm Behind the Beach*. The film was shown to cinema audiences throughout the State in 1987 and is available for sale as a VHS videotape.

A special report by the Director-General,
Dr G. I. Alexander.

Centenary Year

In 1987, the DPI achieved a century of service to the people of Queensland. To highlight this achievement and the Department's history, work and services, a Centenary year commemorative programme was planned and implemented. Centenary publications, displays and audio-visuals were produced and special events staged.

Logo and theme. A Centenary logo was designed and used extensively on DPI stationery, folders, publications and displays. The theme for commemorative activities was 'Helping Queensland Grow'.

Poster. A commemorative Centenary poster, presenting a four-colour montage of agricultural development, was designed for display in DPI centres and at other venues throughout Queensland. *The Queensland Agricultural Journal* featured the poster on its May-June 1987 cover.

Publications. The DPI's history was comprehensively covered in a series of publications, some completed and others in production.

The official 12-chapter history, researched and written by Dr Percy Skerman retired Reader in Agriculture at the University of Queensland, was being prepared for placement in library archive collections throughout Australia. This work is a major reference document.

A high-quality illustrated history, *Guiding Queensland Agriculture*, based on Dr Skerman's work, was also being produced. A condensed history monograph was produced and distributed to DPI officers as were five issues of a *Centenary News* newsletter.

A history brochure, 'The DPI ... a century of serving Queensland', proved popular with the general public. The *Queensland Agricultural Journal's* May-June 1987 issue devoted space to the DPI's Centenary and history.

A book of short stories and photos entitled *Harvest and Heartaches—images and stories of Queensland's agricultural past* was being compiled for sale towards the end of 1987. During its production, rare photographs and unusual stories were unearthed.

A major Centenary project was the compiling, designing and production of a series of four-colour brochures summarising Queensland's primary industries and the DPI's services to those industries. The brochures, A2 in size, cover the field crop, horticultural, beef, sheep and wool, dairy, pig, poultry, and fishing industries; land conservation; and all of Queensland's primary industries.

Audio-visuals. A significant project was the production of a 17-minute 35 mm film, *The Farm Behind the Beach*, which premiered in Brisbane in March and was subsequently screened in Birch, Carroll & Coyle Limited cinemas throughout Queensland. The film presents a series of colourful images depicting the importance of agriculture to Queenslanders' lifestyles. Video copies of *The Farm Behind the Beach* are available for sale from the DPI's Information Branch in Brisbane. The film was made the centrepiece of the DPI's Brisbane RNA Show display during August 1987.

A slide presentation, *A History of Service*, detailing some of the DPI's major achievements, was produced and transferred to video for screening at the June 17 Centenary Day celebrations in Brisbane.

Special events. The DPI's Centenary Day on 17 June began with a free public breakfast for more than 3500 people in Brisbane's King George Square. The breakfast, and associated displays and demonstrations, proved popular despite rain. In the evening, the Minister for Primary Industries, Mr Harper, hosted a formal dinner for 300 key agricultural industry figures at the Sheraton Hotel, Brisbane.

Displays and gifts. Historical displays featured at both the formal dinner and the King George Square breakfast. These included photographic displays entitled 'The Johanson Collection', and 'The DPI ... Its Early Years' and a display listing the DPI's achievements entitled 'Milestones'. The 'Early Years' and 'Milestones' displays were making the circuit of DPI field days and open days throughout Queensland during Centenary Year. The DPI produced a range of Centenary souvenirs including glasses, coffee mugs, jackets and sloppy-joes, and a special vintage Centenary Year port.

Promotion and future. The DPI received extensive mass media coverage of its Centenary: from a listing in Telecom's country telephone directories to a 48-page pictorial and feature coverage in the *North Queensland Register* newspaper. Queensland's media outlets were given comprehensive Centenary Information Kits to compile their own DPI centenary stories, and *Queensland Unlimited* gave prime-time television coverage of the Department's centenary. In addition, the DPI produced regular Centenary Year updates through its *Queensland Agricultural Journal* and its weekly 'News Items' and the 'Rural Industries Today' radio programme.

Drought

The year began with 13.5 shires, representing 24% of Queensland, drought declared. Winter rains in May, July and August brought relief and, during October, revocations of declared areas began. Although the traditional wet season once again failed, summer shower and storm activity improved conditions in most districts. However, rainfall on the Darling Downs and in the Maranoa, and in coastal and hinterland districts tended to be below average.

In many districts that received below-average summer rain, winter rains brought relief. About 70% of the State's winter crop had been planted, but subsoil moisture levels were low and follow-up rain was needed.

The number of declared shires had declined to 6.5, representing 4% of the State, but the number of individually droughted properties (IDPs) had increased. They peaked at 2149 in October and, thereafter, declined to a low of 847 in March. From March to May, IDPs increased by 122% to 1875. They were increasing on the Darling Downs and in the Maranoa, in some central coastal areas, and in the coast and hinterland areas extending from Bowen to Townsville.

Other natural disasters

Few other natural disasters occurred. In November, an extensive hail storm damaged crops in the Bundaberg area. On Christmas and Boxing days, one of the most extensive hail storms seen on the Darling Downs flattened crops and pastures and damaged buildings.

In February, Cyclone Jason appeared in the Gulf. It did little damage and brought good rain to many parts of Queensland's north-west and western border areas. During May, heavy rain on the Gold Coast caused extensive flooding and damage to agricultural enterprises.

Expenditure

Drought subsidy payments, paid monthly, reached a peak of \$1.5m in October. Overall subsidy payments decreased by 5%, mainly owing to reduced rail-freight subsidies. In more extensive areas, many properties had destocked during the 1985-86 drought and, with a continuing drought, made fewer livestock movements in 1986-87.



The Minister for Primary Industries, Mr Neville Harper, serving sausages and bacon at the breakfast to mark the DPI's 100th birthday on 17 June in King George Square. Karin Koch, of the DPI's entomology branch, was on hand to help Mr Harper.

The year in review

DPI research

Research and development programmes continued to be an important source of the technical information that is a vital component of extension work and agricultural production technology.

About 800 DPI staff members spent most of their working time on R and D projects. They used the facilities that the DPI provides in central laboratories in Brisbane, in laboratories at major regional centres, on 26 research stations and, in some instances, in local farmer trials.

External funding for research work was an important input to projects. The newly formed Rural Industry Research Councils funded substantial work.

Collaborative projects with the CSIRO and James Cook University, which were partly funded by Australian Meat and Livestock Research and Development Corporation, saw several developments in automatic cattle management systems designed to reduce mustering and handling costs. Nutritional and management methods—to improve reproductive rates and animal growth and meat quality—were studied.

Industry funding also helped in developing improved crop cultivars, particularly in wheat and maize.

The development of an analytical technique to directly measure the loss of nitrogen in gaseous form from heavy clay soils attracted world-wide attention to the DPI's Queensland Wheat Research Institute in Toowoomba. This development is of great significance in the management of the application of nitrogenous fertilisers to many of the State's cropping areas.

Of great interest to horticulture-crop growers was the development of a simple and efficient mechanism to treat plants for phytophthora root diseases. The method, which involves injecting the chemical phosphorous acid into the tree stem, has a wide application in most tree-crop production systems.

DPI research across a wide range of disciplines also ensured that the quality of food products, particularly in dairy, fish, meat and fruit areas, remained at a consistently high level.

Funds provided by the Australian Wool Research and Development Council were used in projects to increase wool growth, selection efficiency and lamb survival and to improve the efficiency of blowfly control. Complementary grazing patterns of native pasture by sheep and goats were also studied.

DPI biometricians helped ensure a high standard of experimental research by providing a consulting service, augmented by a series of 12 workshops to improve researchers' understanding and knowledge of statistical concepts; the design, conduct and analysis of experiments; the interpretation of computer output; and the presentation of scientific papers.

Extension

The importance of having a skilled extension workforce was reinforced during the year as many industries were suffering economic hardships.

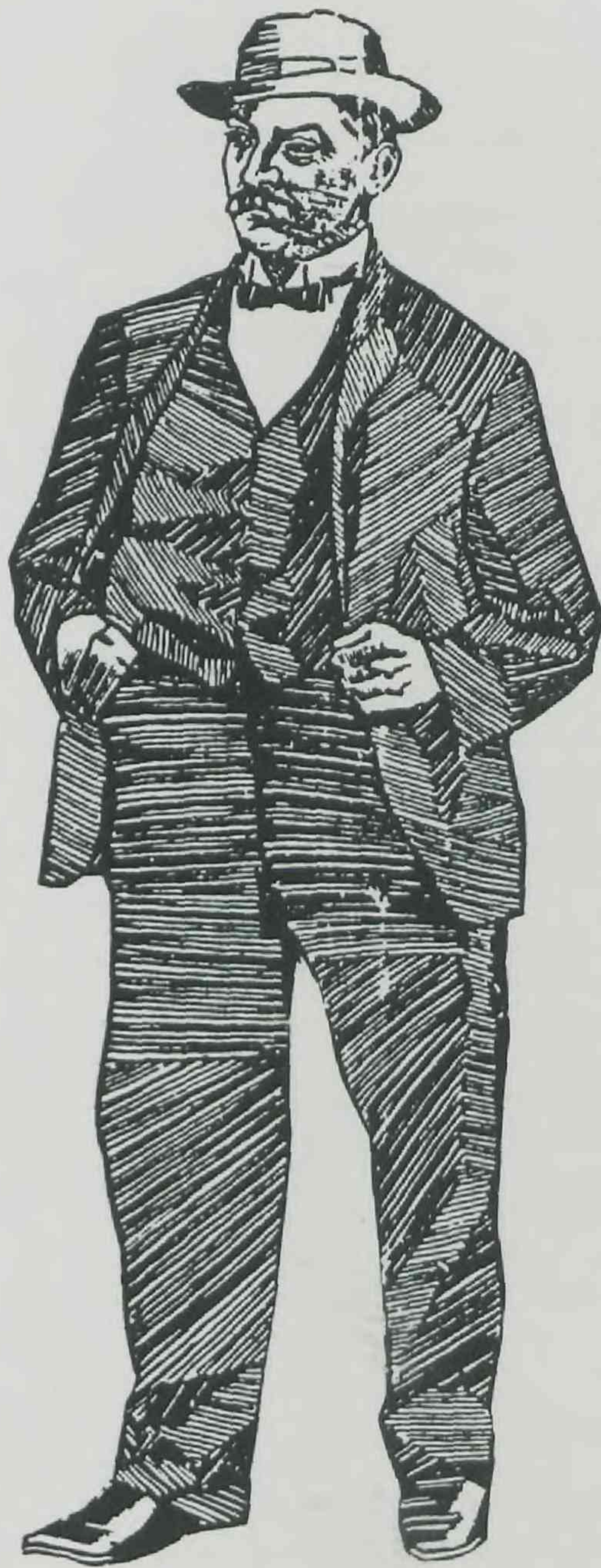
District extension officers supported Queensland's primary producers through on-farm visits and planned extension activities. More than 200 industry-based extension projects were conducted. Extension officers provided a link between producers, research workers and other community members, an important aspect of getting a more integrated approach to the solving of rural production problems.

The extension service gave additional help to industries facing new and continuing challenges. Economic developments in the grain and sugar industries had led to restructuring and diversification, and horticultural industries were undergoing continuous change. Interest was also growing in new and exotic tropical-tree-fruit species. Chick peas and other winter legumes were becoming increasingly important alternative crops for traditional cereal crop growers. The extension service was also supporting the final and most difficult phase of the Brucellosis and Tuberculosis Eradication Campaign in Queensland's far west and north.

Extension officers were increasingly called on to justify the effect that agricultural production systems have on the environment. Conservation farming was a continuing priority, and initiatives in fisheries extension focused on developments in aquaculture, and the importance of mangrove ecology and wetlands maintenance to fishing industries.

The continued economic difficulties being experienced by some producers had resulted in seven specialist financial counsellors being appointed to key rural centres during the year.

New and more effective information-delivery methods continued to be developed for producers and others making increasing demands on the extension service. Newsletters designed in district offices, and fact sheets and saleable publications produced centrally were being produced and used in increasing numbers. Further progress was made with self-service information stands, sales of publications through commercial outlets, and a producer information centre. Computer-based information systems were being refined to help producers, and computerised crop models were



The outstanding scientific career of Charles Joseph Pound, who became director of the first Stock Institute in Queensland in 1894, was commemorated at the DPI's Animal Research Institute, Brisbane, in August 1986. The commemoration was held in conjunction with the 6th International Congress of Parasitology.

Dr Pound's versatility in both medical and veterinary science created a newsworthy public figure at the turn of the century.

His pioneering studies on tick fever in cattle laid the foundation for Queensland's current world leadership in the control of this serious disease.

DPI scientists are now able to help overseas countries with the same problem. A display depicting an ACIAR-sponsored research project with Sri Lanka was part of the C.J. Pound commemoration.

being used to help in decision making and managing crops.

The extension service's relevance was strengthened by the work of the DPI's evaluation unit, which assisted in, surveyed or evaluated the outcome of more than 50 extension projects. The unit established that producers preferred on-farm visits by extension officers to making visits to DPI offices, and welcomed the topicality and usefulness of locally produced newsletters.

Conferences and field days

The Sixth International Congress of Parasitology was held in Brisbane in August. In conjunction with the congress, the DPI's Animal Research Institute, Brisbane, held a ceremony to commemorate C. J. Pound, an eminent government scientist who, at the turn of the century, worked on a variety of animal diseases including tick fever. Many overseas and interstate visitors attended the congress and saw technical displays of DPI research on the control of parasitic diseases in animals.

In mid-1986, the DPI's standards branch hosted the 21st International Seed Testing Association Triennial Congress attended by 250 delegates and 35 accompanying visitors from 55 countries. A seed symposium, comprising 128 papers in eight specialist areas of seed technology, was held in conjunction with the congress. A regional seed-testing workshop, attended by 10 Australian and 13 overseas participants from Argentina, Colombia, Kenya, Mozambique, New Zealand, the Philippines, South Africa, Thailand, Zambia and Zimbabwe, was also organised.

Field days continued to play an important role in the DPI's liaison with primary producers. A particular example was the open day at the Poultry Research Centre, Redlands, which attracted visitors from throughout the State. They saw the range of services that the DPI provides to the poultry industry and the research work done to improve efficiency and reduce costs.

As part of the DPI's Centenary Year programme, open days were held at the Brian Pastures (Gayndah), Biloela and Kamerunga research stations. These days were well attended by primary producers, rural business people and schoolchildren.

'Westech', a two-day exposition of labour-saving handling equipment for the sheep and cattle industries, was held at Barcaldine in September. About 3500 producers from all districts of western Queensland attended. Producer and exhibitor opinion was being evaluated to determine the exposition's future direction and frequency.

DPI facilities

At the Arid Zone Research Institute, Longreach, construction of the office-laboratory complex began in October 1986 and was scheduled for completion in late October 1987. DPI staff will occupy the complex in November 1987. 'Rosebank', a 6700 ha property acquired on Longreach's outskirts, will be run in conjunction with the institute.

At the DPI's Agricultural Research Laboratories, Indooroopilly, work began on extensions to the hydrology building to house soil conservation services branch staff.

At Biloela Research Station, construction was well advanced on a 'genetic resources centre' to store seed of varieties of tropical field crops. This facility, which is being funded by the Commonwealth Government, is part of a national scheme to maintain a wide range of genetic material for future plant-breeding programmes.

At Wacol, construction of a new 160-pen boar performance testing station was nearing completion and was expected to be fully operational in 12 months' time. It replaces an existing smaller Rocklea facility, which, from 1957, had operated a boar progeny testing service and, from 1969, a performance testing service. Since 1957, the DPI's central boar-testing scheme has contributed greatly to genetic improvement in the Queensland pig industry.

In Toowoomba and Rockhampton, regional veterinary laboratories for diagnosing livestock diseases were opened. These new laboratories, together with existing diagnostic centres in Brisbane and Townsville, will improve the DPI's service to animal health in Queensland's widespread livestock industries.

At the Animal Research Institute, Yeerongpilly, a molecular biology laboratory was opened. Work already undertaken in the laboratory has resulted in new technology being used to diagnose chlamydia (a disease of animals, birds and man) more effectively.

At the new Bundaberg Research Station, completion of the laboratory-office building and an extensive underground irrigation system enabled research work to begin. A machinery/workshop building and greenhouses were being built.

At Roma Research Station, the recently completed field laboratory, residence and farm buildings were occupied, and the station was functional.

Batavia Downs, a 199 000 ha Peninsular cattle property, had been taken over and, before being developed, was being destocked for disease control in that area.

At Mutdapilly and Warrill View research stations, additional land and buildings were acquired to accommodate an expanded research programme to further develop the dairying industry.

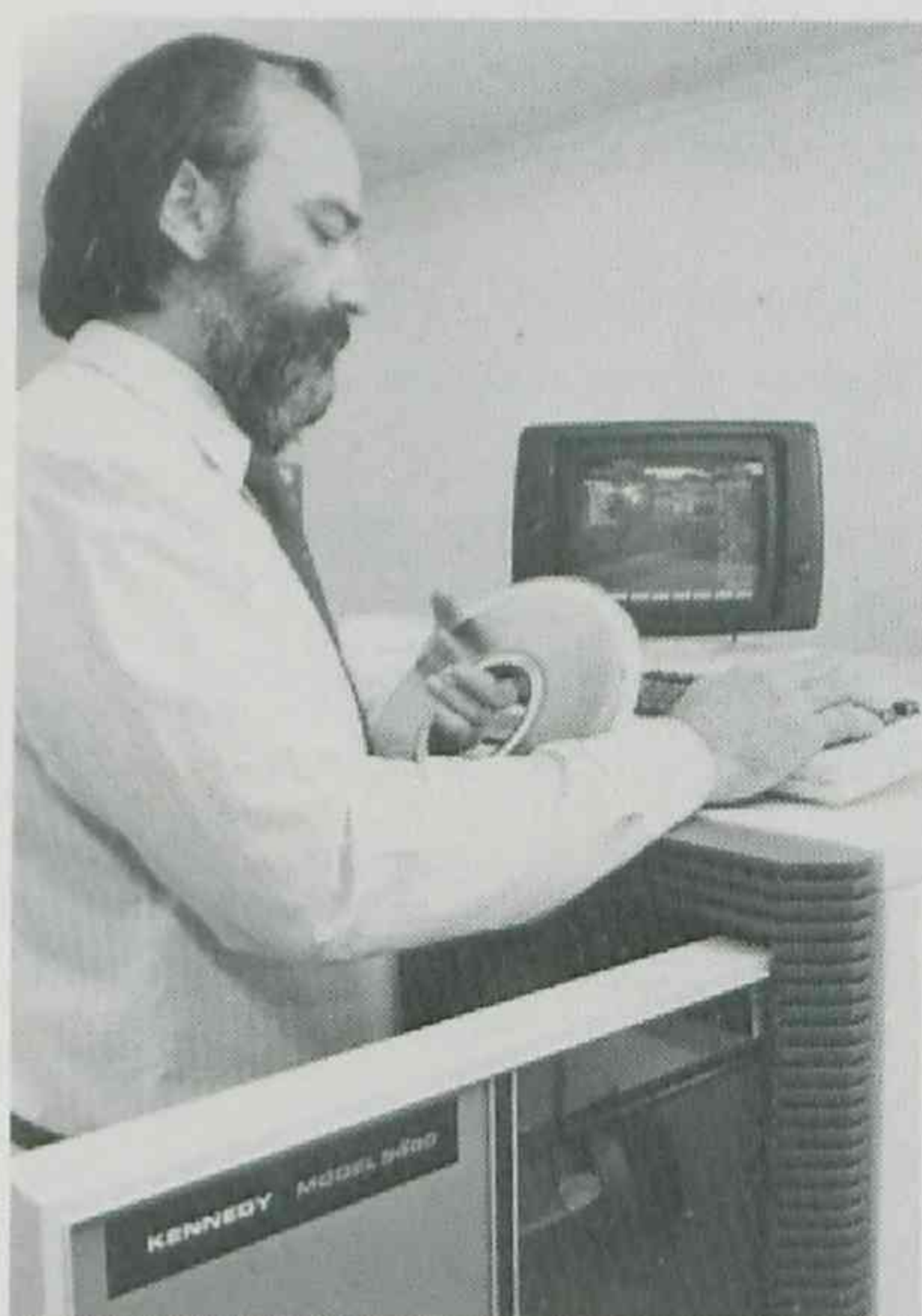
On Bribie Island, development of the aquaculture centre continued and a boat storage-workshop facility was built. This facility will also service the management of the Pumicestone Passage Marine Park. Similarly, at Redlands Research Station, a boatshed-workshop was built to help fisheries management in Moreton Bay.

At Hermitage Research Station, a solar absorber, designed by DPI agricultural engineers, was built as an alternative energy source to assist electrical heating of glasshouses.

At Ayr, Brian Pastures, Emerald, Mutdapilly and Southedge research stations, facilities were extended and additional buildings provided.

New branches

A further reorganisation occurred within the division of dairying and fisheries. Two new branches were formed—dairy husbandry and animal breeding branch, and food research and technology branch. They incorporated staff from the previous branches of field services, dairy cattle husbandry, and food research. All dairy-farm activities are now the responsibility of the dairy husbandry and animal breeding branch. The food research and technology branch now has the resources to provide a more comprehensive extension service to the food-processing industries.



The network administrator of the DPI computer network (QDPINET) loads a tape on one of the DPI's Pyramid 90X computers. These computers are located at the Agricultural Research Laboratories, Indooroopilly, and the Animal Research Institute, Yeerongpilly.

Computing facilities

More DPI staff were able to access the DPI computer network, QDPINET, which was progressively extended over the year. Officers at Mineral House, the State Law Building, Indooroopilly, Yeerongpilly, Wacol, Toowoomba and Rockhampton could statistically analyse data, simulate agricultural systems and develop on-line information systems on the central computers. Users with microcomputers at smaller country centres were using the AUSTPAC link to access QDPINET. On-line information systems, the development of which had only been possible with the establishment of QDPINET, were becoming operational and were greatly enhancing DPI technical and administrative operations.

Computer drafting

A computer-assisted drafting (CAD) workstation was commissioned in the drafting section of the DPI's land resources branch, Indooroopilly, to prepare maps and provide data-manipulation facilities for thematic maps. The work station comprises colour terminals, a stand-alone computer, a flat-bed plotter, a colour copier, a digitiser and a printer.

The system is connected to the State Government Computer Centre for access to the ARC INFO software and can reproduce data that has been entered through a digitiser or as coordinate data from computer files. It can prepare any kind of map or diagram, ranging from a complex land-resource study to a simple farm plan.

Artificial breeding

The Wacol AB Centre continued to expand its activities, establishing 34 agencies throughout Australia as part of a comprehensive national marketing scheme. The centre became the first Australian agency for marketing semen from the Swedish and Danish Red breeds of dairy cattle.

After a trial period, the pig AI service began marketing semen in August 1986, shipping almost 1500 doses of chilled boar semen to 100 Queensland and 20 interstate pig producers. Top performance-tested donor boars of the Yorkshire, Landrace, Duroc and Synthetic breeds were maintained at the Wacol AB Centre. In 1987-88, the existing distribution system will also market frozen boar semen imported from Alberta, Canada.

Producers' increased interest in beef improvement and performance recording was evident by the 120 who attended 15 AI courses held throughout Queensland. These courses are designed to teach producers insemination techniques.

Brucellosis and tuberculosis

Queensland is on target to achieve freedom from brucellosis by 1 January 1989. Only 13 herds with infected status remained. A total of 1.5m blood samples had been tested, with half the samples being collected from meatworks.

Progress had been made with tuberculosis eradication, although some difficulties were encountered in the extensive areas where cattle control is more difficult. The

number of infected herds was reduced from 125 to 89, and many of these were under destocking programmes. Abattoir monitoring of more than 2.3m cattle detected 382 lesioned animals (0.02%), while almost 1m field tests detected 1124 reactors (0.12%).

Exotic disease planning

A major exotic disease exercise was held at Charleville in October. DPI officers collaborated with State Emergency Services, Police and Rural Lands Protection Board officers and interstate and overseas observers. The exercise highlighted the speed with which disease can be spread once travelling livestock are infected with an exotic pathogen.

In the field, DPI officers always include exotic diseases within their differential diagnoses of livestock. In 1986-87, officers investigated a number of cases that presented signs similar to exotic diseases. In one case, mucosal disease was the cause of sickness in a calf and, in another, snout blisters and reddening of the skin in pigs were caused by their ingesting psoralens, a natural constituent of celery, that had been fed to them two days earlier.

Livestock marketing

AUSMEAT, the national uniform trading language for describing carcasses of cattle, sheep, pigs, goats and buffalo, and CALM (Computer Aided Livestock Marketing) were established. These advances have the potential to improve the efficiency of livestock marketing and to encourage better matching of livestock sold with specific carcass requirements. AUSMEAT has adopted age and fat standards, for colour-branding of beef carcasses, that are acceptable to the States.

New maize hybrid

Sloan, a new maize hybrid for the Atherton Tableland, was released from the Kairi Research Station breeding programme early in 1987. It honours a previous director-general, W. J. S. Sloan, who was born on the Atherton Tableland. Sloan has a 9% yield advantage over the previous highest-yielding maize hybrid, and, when grown at higher plant densities than is current practice, has yield advantages of 20% and more.

Citrus mealybug control

After several years' investigations, a parasite imported from California to control citrus mealybug was mass reared commercially and released last year over 100 to 150 ha of citrus in south Queensland. Citrus growers adopted the control procedure enthusiastically. Research workers mass released the parasite, helping to establish it as the dominant natural enemy of the mealybug, an important pest of citrus and custard apples in southern Queensland. Initially, the parasite became well established, but recovery of the population after winter was slow. Additional releases were needed in spring or early summer to maximise its effect on mealybug infestations.

Two new insects

Two new insect pests were confirmed in Queensland: the six spotted mite and the leucaena psyllid.

The six spotted mite (*Eotetranychus sexmaculatus*) was recorded from avocados near Nambour. It is a sporadic pest of citrus and avocado in California, Florida and Taiwan and of grape vines in Arizona and New Zealand. Observations on its host range and pest potential in Queensland were continuing.

The leucaena psyllid, which is a native of central southern America and which had been rapidly spreading over the Pacific region, was reported for the first time in Australia at Bowen. Heavily infested leucaena plants failed to flower, with resultant loss of seed production. Severe defoliation also occurred, reducing the value of infested plants for stock fodder. Regular monitoring of psyllid infestations in coastal Queensland from June onward found psyllid populations significantly reduced during hot, dry weather in December to January. However, a resurgence of pest populations occurred in May, after wet weather during March and April.

In field experiments, spray treatments controlled psyllid infestations. While such treatments may be useful in protecting young plants, the economies of treating established crops is doubtful. It remained to be seen how serious this tropical insect was in Australia's drier areas where leucaena shows the most promise. Indications are that it is not as serious as first thought.



A DPI senior entomologist looks for signs of the 2 mm long yellow-green leucaena psyllid, which was reported for the first time in Australia at Bowen in 1986. This insect pest spread along the coast from Cooktown to Brisbane, infesting leucaena plants and causing severe defoliation.



Queensland produce attractively displayed at the DPI stand at the International Food Exhibition, London, from 1 to 5 February. During the year, DPI trade development officers displayed Queensland produce to advantage at several other overseas trade fairs. A video, *The Bottom Line*, was produced to help growers come to grips with the export market.

White rust outbreak

Chrysanthemum plants imported by some Queensland growers came from a Victorian nursery where the fungus disease white rust was subsequently detected. Careful and thorough inspection by DPI staff resulted in all Queensland outbreaks of the disease being found and infected plants destroyed. At 30 June, Queensland was free of the disease and quarantine measures were being developed to prevent further outbreaks.

Dairy marketing

The Minister for Primary Industries, Mr Harper, commissioned a study to consider forming a single dairy cooperative to rationalise manufacture and marketing of Queensland dairy products. While this is happening, the Minister has frozen processor entitlements in south-east Queensland. Further changes in milk-entitlement policies will not be introduced until the report is considered and evaluated. Since its establishment, the Milk Entitlements Committee has distributed more than 250 000 L of market milk entitlement. This represents about 42% of all market milk in south-east Queensland.

Overseas projects

The DPI was managing eight projects overseas for the Australian Centre for International Agricultural Research (ACIAR). DPI research staff were collaborating directly with researchers in Malaysia, Thailand, the Philippines, Indonesia, Sri Lanka, Papua New Guinea and Vanuatu.

On behalf of the Australian Development Assistance Bureau (ADAB), the DPI was managing a project in China to strengthen the operations of Beijing's Institute for Control of Agrochemicals. The project was expected to end successfully in 1987 after DPI staff had run a final training period for Chinese technicians in China.

Approaches were made to the DPI to take part in joint development projects overseas. Projects being considered included cocoa quality improvement in Papua New Guinea; livestock and pasture development in Vanuatu; and smallholder cocoa improvement in Western Samoa. Contacts and relationships developed from those overseas activities should prove valuable to Queensland's agricultural service industries.

Training overseas

Agencies such as ADAB and the Food and Agriculture Organisation (FAO) were increasingly recognising the DPI's expertise. DPI and Queensland industry officers conducted six ADAB-financed courses covering grain-distribution planning, financial accounting and principles of management in Malawi and Kenya. The DPI also conducted a pasture-management course in Manila for the FAO, and provided a 2-week segment on extension, in Fiji, as part of a training course for fisheries extension officers from the South Pacific.

Training in Queensland

The DPI contributed technical expertise to six training courses conducted by Australian and Queensland consultancy firms. Five of the courses were in livestock development for Indonesia and one was a marketing course for Thailand.

Requests continued to be received from individuals from developing countries for technical training programmes. Eighteen individuals were trained, from 2 weeks to 6 months, in subjects such as entomology, tick-fever vaccine production, soil conservation, agricultural crops, marketing, soil and plant analysis, beef cattle husbandry, pastures, horticulture and economics.

In addition, 14 individual study tours and 16 group study tours, involving the whole range of DPI expertise, were organised.

Special employment

The DPI again took part in the Community Employment Programme, providing employment and work experience for long-term unemployed people and benefiting from subsidised improvements to seven research stations. These improvements ranged from new buildings to extensive tree plantings and erosion-control structures.

Finance

Upgrading continues

The DPI's computerised accounting system continued to be upgraded with new ordering and vehicle-fleet management systems being implemented.

These developments are part of a continuous programme to enhance and expand the DPI's accounting system, enabling its accounts branch to be more flexible and effective in providing accounting information to the Department.

Compensation increase

Additional costs of \$8.3m under the Commonwealth-State Bovine Brucellosis and Tuberculosis Eradication Programme were mainly due to increased compensation payments resulting from increased destocking activity.

Departmental expenditure from the various funds is shown on this page.

CONSOLIDATED REVENUE FUND

	1985-86 \$	1986-87 \$
Department of Primary Industries		
Salaries	58 047 928	61 642 883
Contingencies	49 260 727	62 130 418
Payment authorised by special act		
Grant in aid of the Banana Industry Fund	156 616	158 604
Total	107 465 271	123 931 905

Costs associated with Commonwealth-State Bovine Brucellosis and Tuberculosis Eradication Programme were:

	1985-86 \$	1986-87 \$
Eradication	10 680 000	11 996 000
Compensation payments	9 428 000	16 434 000
Additional assistance	474 000	994 000
Total	20 582 000	29 424 000

TRUST AND SPECIAL FUNDS

	1985-86 \$	1986-87 \$
Department of Primary Industries		
Special Standing Fund	20 888 588*	20 887 480†
Banana Industry Fund	334 493	266 473
Commonwealth Poultry Industry		
Assistance Fund	1 964 505	1 036 862
Commonwealth Quarantine and Export		
Inspectors Fund	4 922 600	4 584 457
Commonwealth Rural Industry		
Grants Fund	3 754 028	4 266 705
Fisheries Research Fund	375 041	373 998
Meat Inspection Account	3 331 107	3 648 704
Poultry Industry Fund	870 286	966 296
Stock Disease Compensation and Stock Improvement Fund	28 310	34 433
Sugar Cane Prices Fund	2 091 031	2 157 953
Swine Compensation Fund	NIL	621
Total	38 559 989	38 223 982

* Includes \$9,465,156 on account of the Disaster Assistance Scheme and \$827,245 on account of the Queensland Fish Board.

† Includes \$9,948,197 on account of the Disaster Assistance Scheme and \$805,448 on account of the Queensland Fish Board.

LOAN FUND

Expenditure of \$320,000 was incurred through the Loan Fund to 30 June 1987.

Primary industries overview

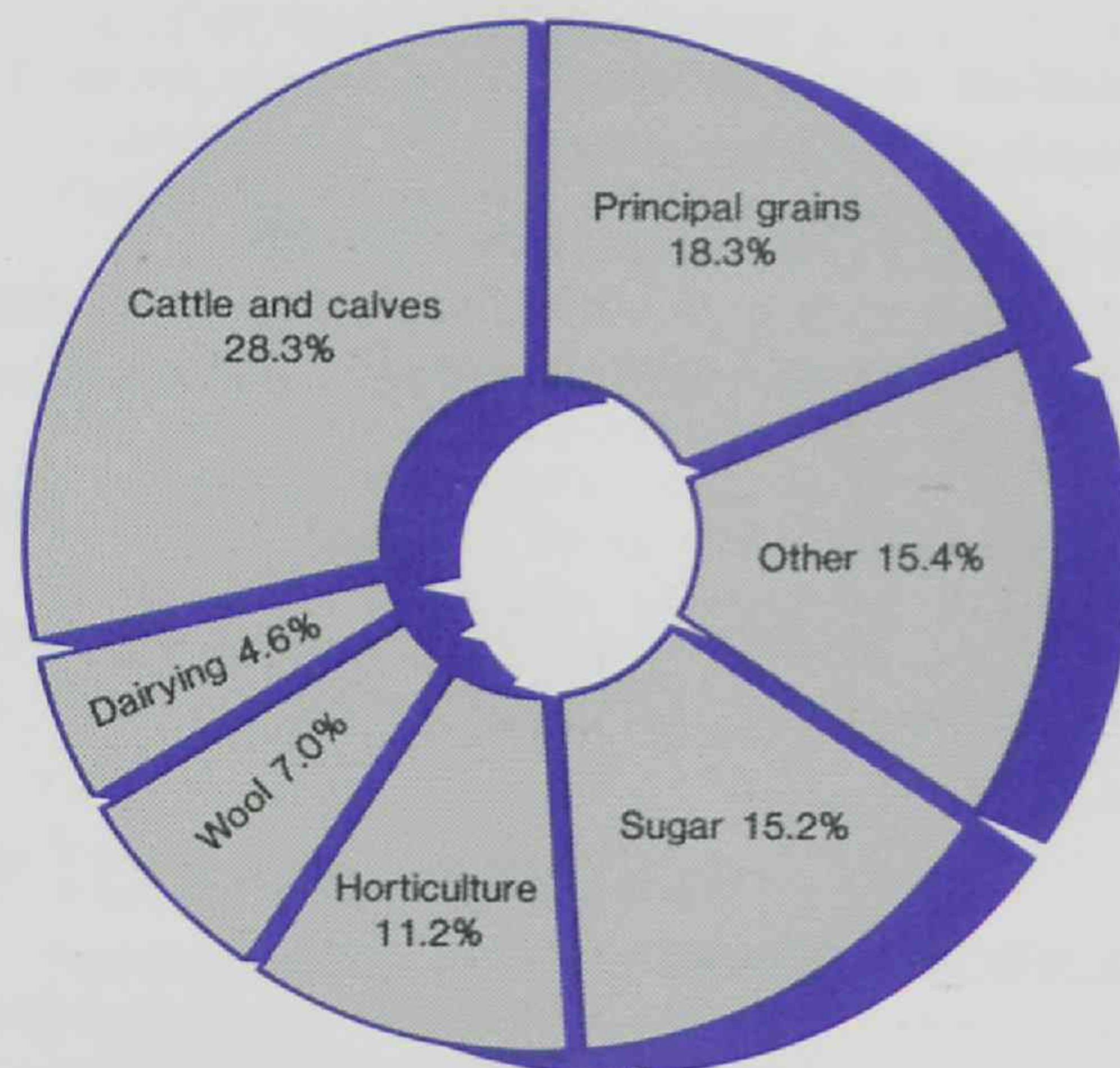
Rural production values

The estimated gross value of rural production in Queensland in 1986-87 was \$3,206m, about 2.2% more than in 1985-86. The increase was due mainly to higher sugar, livestock and livestock-product prices.

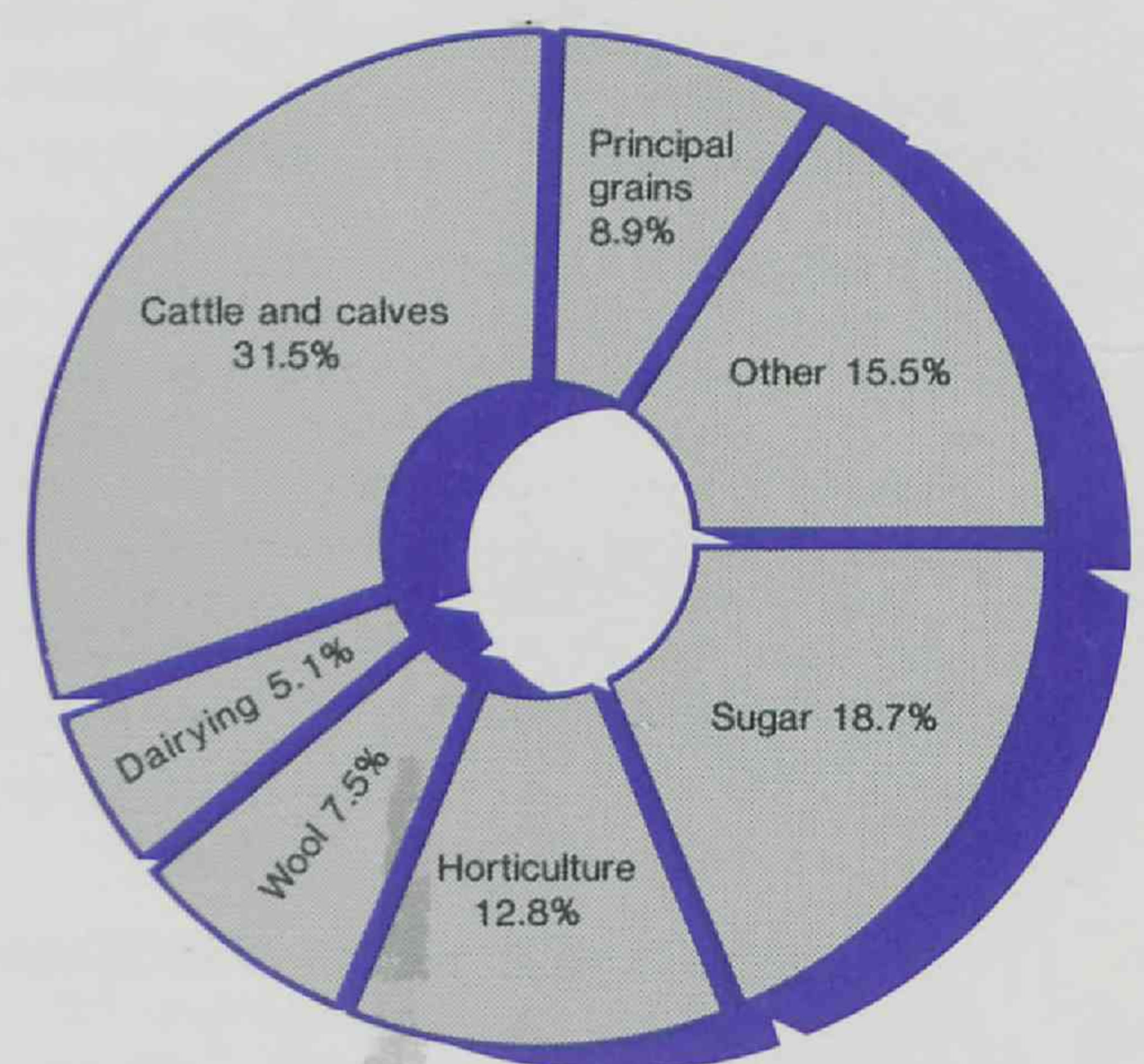
Livestock slaughterings (and other disposals) were valued at \$1,195m, up 13%. The value of cattle and calf slaughterings rose by more than 13% to \$1,009m. The value of poultry slaughterings, at \$75m, and pig slaughterings, at \$99m, were up 10.5% and 8.9% respectively. Wool production was estimated to be worth \$240m, up 9%. Horticultural production was valued at \$410m, up 16%.

The value of cereal grains was expected to fall by 50% to \$248m. This was due to reduced plantings, brought about by a depressed market outlook for the major grains and lower yields resulting from poor seasonal conditions in most areas. The EEC-USA trade war particularly affected world market prices, and only the low value of the Australian dollar, relative to the major overseas currencies, kept prices to Australian farmers from plummeting to even lower levels. Wheat, barley and sorghum values fell by 55%, 75% and 34% respectively.

1985-86



1986-87



The beef industry

Beef cattle numbers in Queensland were estimated at 9.512m head (a 3% increase) at 31 March. During 1986, producers began herd rebuilding, and this trend was expected to continue through 1987 and beyond.

Generally, the year was one of industry improvement, with slaughterings, production and exports all showing increases. Overseas demand was stronger, especially from the major markets, USA and Japan.

Cattle and calf yardings reached 2.682m head, up 439 000 head. The Queensland cattle market index rose from 88.8 to 104.2, reflecting the higher cattle prices experienced throughout the year.



The wool industry

The Queensland sheep flock numbered 14.313m head at 31 March, up almost 200 000 head. Queensland wool production was estimated at 68.7m kg, with a gross value of about \$240m.

The outstanding features of the wool market were large increases in auction prices, increased production and sizeable reductions in Australian Wool Corporation stocks.

Sheep numbers, wool production and consumer demand for Australian wool were expected to increase in 1987-88. Consequently, the average auction price was forecast to be 5% above the 1986-87 price, but significantly below the 753c/kg peak recorded in April 1987.

The sheep meat industry

Sheep and lamb slaughterings were 1.476m head at 30 April, an increase of 48 000 head. Total production was 26 239 t, up nearly 3%. Sheep prices showed particular strength towards the year's end. Mutton and lamb exports were also up, owing to an increasing demand, in particular from the USA and Japan. The higher prices resulted in significant herd rebuilding, a trend expected to continue at least for another year.



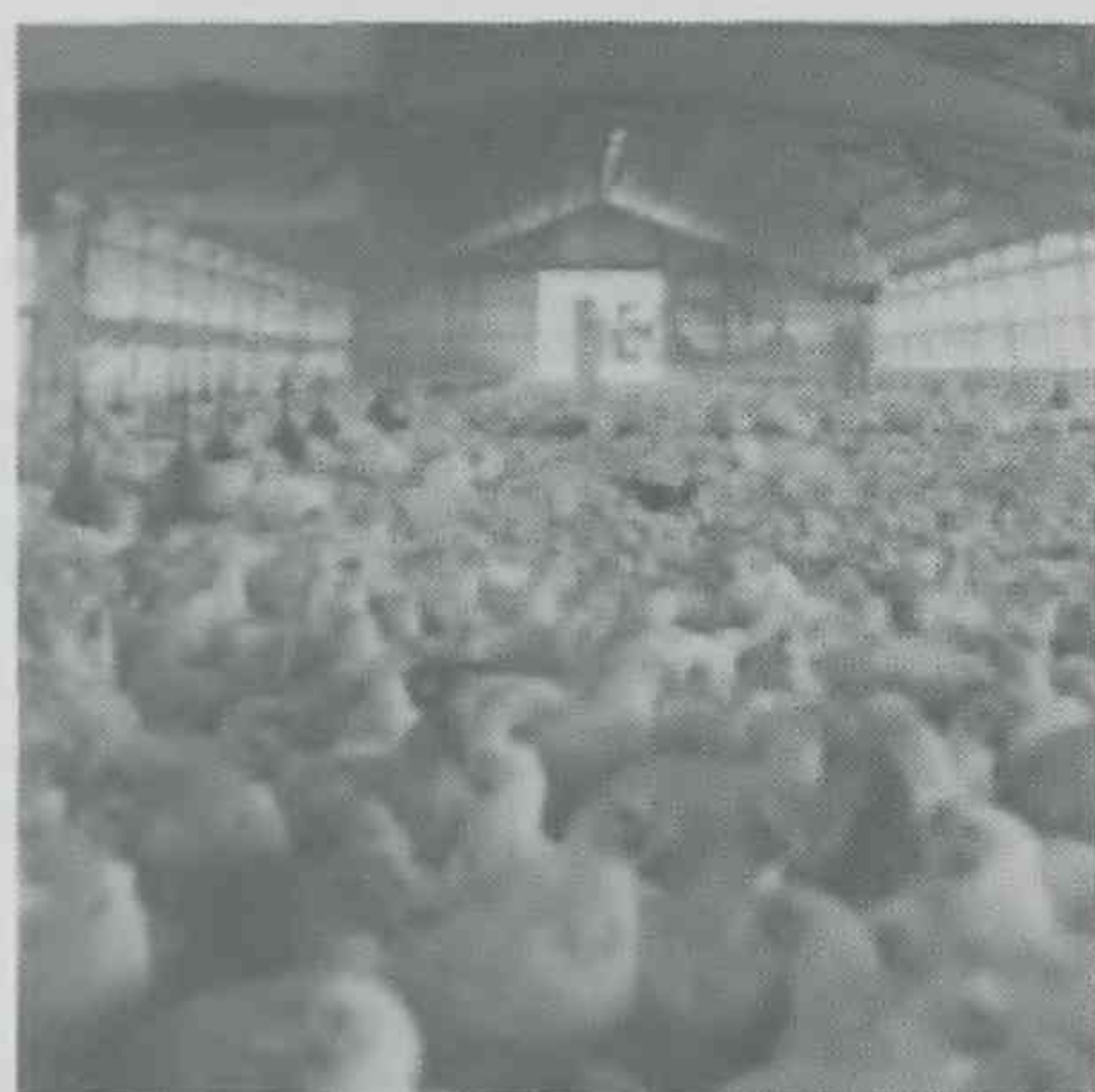
The pig industry

Queensland pig slaughterings were expected to increase by 2.4% to 1.033m head compared with 1.009m head in 1985-86. However, owing to lower slaughter weights, pigmeat tonnage was expected to increase only marginally on the 64 000 t produced in 1985-86.

Stimulated by favourable returns, sow numbers increased by about 4% to 77 000 head.

Lower grain prices helped keep feed prices stable at an average of \$205/t throughout the year.

Consignment prices for top-grade baconer pigs rose from \$1.48/kg to a peak of \$1.80/kg in the December quarter, subsequently falling to earlier levels by year's end.



The poultry meat industry

Poultry-meat demand continued to strengthen, reflecting the fall in real chicken-meat prices (after adjusting for inflation) so characteristic of the industry since the 1950s. Efficient nutrition and feeding practices, and lower feed prices are the main reasons for the fall.

Meat chicken slaughterings were forecast to rise by almost 11% to more than 46m chickens, while chicken-meat production was expected to be 58 000 t, up about 12%. Poultry-meat consumption was forecast to increase to more than 24 kg/person in 1986-87.

After the regular half-yearly review of indexed production costs, the Chicken Meat Industry Committee set the price paid by processors to contracted growers for rearing chickens at 32.9c/bird for July to December 1986 and 33.4c/bird from January to June 1987. The average growing fee was 33.15c/bird, up 5.2%.



The egg industry

Egg production in Queensland was estimated to be 31m dozen, down 5%. Egg supply effectively matched demand in south and central Queensland, but a significant surplus was reported in north Queensland. However, by year's end, supply in the north again matched demand.

Egg sales by both the South Queensland Egg Marketing Board and the Central Queensland Egg Marketing Board were estimated to be similar to 1985-86 sales.

Individual producer payments, which closely reflected the degree to which the mixture of grade sizes matched consumer demands in the South Queensland Board area, further helped eliminate surplus production. Introduction of a requirement for higher yolk-colour standards was expected to boost consumer acceptance and sales.



The dairy industry

Queensland wholemilk production was estimated at 600m L, similar to production in 1985-86. The relatively low production level was due to extended dry conditions throughout dairy-producing areas and depressed manufacturing milk prices for major processed milk products.

Sales of market milk, which include white, flavoured, UHT and low-fat milk, were expected to increase by 2.3% to about 294m L. Butter production increased by 3%, but milk-powder production fell by 23% after a powder factory closed. Cheese production increased by 1% and non-leviable (specialty) cheese accounted for a record 38% of production.

Average farm-gate returns to Queensland dairy farmers for all wholemilk supplied to factories was higher, due mainly to the higher percentage sold as market milk. The average farm-gate price for market milk was about 40.2c/L and for manufacturing milk 14.1c/L.

New national dairy marketing arrangements were introduced on 1 July 1986. These arrangements subsidise returns from all dairy-product exports with money raised from a market-support levy of 35c/kg butterfat on all milk produced and levies on domestic butter and cheese sales. The national legislation includes a provision (comfort clause) for ceasing the market-support levy if Ministers agree that interstate market-milk movements are undermining State market-milk arrangements.

Market-milk entitlement transfers between producers, at unregulated prices, occurred during the year. State legislation to allow such transfers had been introduced in April 1986.



The deer farming industry

Queensland's deer farming industry continued to expand. Ninety-seven deer farms, with a total deer population of more than 7000, were registered with the DPI. Although expanding rapidly, venison production was still insufficient to meet local demand, and venison was imported from New Zealand.

The industry was associated with, and contributed to, a successful national conference, Aust-Deer 86, held in Brisbane.



The fishing industry

The fishing industry had another mixed year. The \$A devaluation boosted export prices, particularly for prawns, and increased import prices for filleted product. The domestic market remained undersupplied by local product and this, combined with the higher import prices, caused market prices for most lines to rise.

Catches were generally satisfactory in most areas, other than in the Gulf prawn fishery. And a potentially lucrative new prawn fishery (red spot prawns) was identified north of Cooktown.

Concern was expressed at declining catches in the Gulf prawn fishery. NORMAC (Northern Prawn Management Advisory Committee) was implementing major management initiatives to reduce Gulf prawn fishery effort and so relieve pressure on stocks.

No pre-season fishery closures applied in 1986-87. Concern that the central Queensland scallop fishery resource was under stress resulted in industry and the Queensland Fish Management Authority working closely to implement an appropriate management strategy.

On 1 June, the fishery elements of the Off Shore Constitutional Settlement were introduced, extending Queensland jurisdiction in the major fisheries east from the territorial base line to the outer edge of the Great Barrier Reef Marine Park as far south as the 154°E latitude. As a consequence, most of the State's commercial fisheries (except tuna) will be within the jurisdiction of Queensland fishery management agencies.

Another major event of long-term industry significance was the State Government's decision, in early May, to commercialise the Queensland Fish Board's remaining operations. Board properties and facilities were offered for sale by tender to private enterprise and the Board ceased to operate on 30 June 1987. In taking this action, the Government was mindful of the extensive fish receipt, processing and marketing facilities that private enterprise had developed in recent years. These developments had reduced the need for a statutory marketing organisation.



The sugar industry

Queensland's 1986 sugar crush was completed on 2 December when the last of the State's record 24.05m t of cane was crushed. This was 4.5% above the 23m t crushed in 1985.

The sugar content decreased, with an average recorded c.c.s. of 13.12 compared with 13.78 in 1985.

The season was mixed, with excellent results for some and disastrous for others. Central Queensland mills achieved bumper crops and, in some cases, record tonnages. But mills in far northern and southern districts were hit by poor weather, and crops were well below peak.

Sugar production totalled 3.21m t, virtually identical to the 1985 level. The tonnage of cane harvested per hectare increased by 4.1% to 81.4, while the sugar yield fell from 11.13 t/ha to 10.86 t/ha.

After declining continuously since 1980, world sugar prices continued the improvement shown in the second half of 1985. The recovery was due to a steady growth in world sugar consumption and a slight decrease in world sugar production. After averaging US 4.04c/lb in 1985, prices increased to an average of US 6.06c/lb in 1986. After reaching a high of US 8.36c/lb in April 1986, the average monthly price fluctuated between US 4.67c/lb in September 1986 and US 7.51c/lb in March 1987. By end of May 1987, the average price had fallen to US 6.72c/lb.



Grain handling

The Queensland Grain Handling Authority expected to handle about 1.7m t of grain, 50% less than in 1985-86. Dry growing conditions in many areas, had greatly reduced winter and summer grain-crop production.

Work began on an additional 40 000 t of permanent storage at Goondiwindi and 20 000 t at the Mackay export terminal. The latter, with Mackay Harbour Board investments, will greatly improve the speed and efficiency of grain exports from Mackay.



The wheat industry

Reduced plantings and lower yields caused by poor growing conditions resulted in only 0.95m t of wheat being produced, 46% less than in 1985-86. However, quality was good, with much being classified as ASW or better.

The guaranteed minimum price for ASW wheat was \$139.83/t compared with \$149.87/t in 1985-86, and Commonwealth underwriting payments appeared likely. Reflecting firm overseas demand for high-protein wheats, the GMPs for premium categories were again good.

World market prices for many types of wheat fell substantially due to USA and EEC subsidised wheat sales. Indications were that, unless world prices improved significantly, the GMP for ASW wheat in 1987-88 would be only about \$125/t.



The barley industry

Production contracted sharply due mainly to adverse seasonal conditions and a depressed international grain outlook. Queensland output was estimated at about 250 000 t compared with the 1985-86 record crop of 810 000 t. Yields averaged 1.4 t/ha compared with more than 2 t/ha in 1985-86.

The Barley Marketing Board received 161 000 t compared with a record intake of 734 000 t in 1985-86. The small crop restricted export marketing opportunities and only about 30% of intake was exported to outlets in Japan and Taiwan. Despite the discouraging international outlook for grain generally, the demand for malting barley on the world market increased and the Board was keen to keep developing malting barley outlets, especially in China and South America.

The Board sold the bulk of the crop on the domestic market as feed grain and malting barley. A first advance of \$90/t was paid on all deliveries to the Board compared with \$77/t for the previous pool. About 23% of the intake was paid under the cash-option scheme whereby growers elect to accept a discounted cash payment in lieu of the normal pool payments. In recent years, pool payments have been finalised within ten months of delivery. Cash-option payments ranged from \$103.50/t for malting grade to \$91.80/t for feed grade.

Remaining growers delivering to the pool subsequently elected to cash out about 22% of the net pool tonnages under the Board's cash barley scheme. Cash-out payments ranged from \$1.89/t for feed grade to \$14.14/t for malting grade.



The grain sorghum industry

Grain sorghum production was estimated at 930 000 t, down about 16% on the 1985-86 figure, despite a 9.5% increase in the area planted—from 608 000 ha to 666 000 ha. Lack of rainfall during the summer growing period resulted in crop failure and low yields in many areas. Average yield State-wide was 1.40 t/ha compared with 1.95 t/ha in 1985-86.

The world market for coarse grains, including grain sorghum, continued to be influenced by USA export enhancement and price-support policies, particularly for corn. Export prices for Australian sorghum are normally closely related to US corn prices.

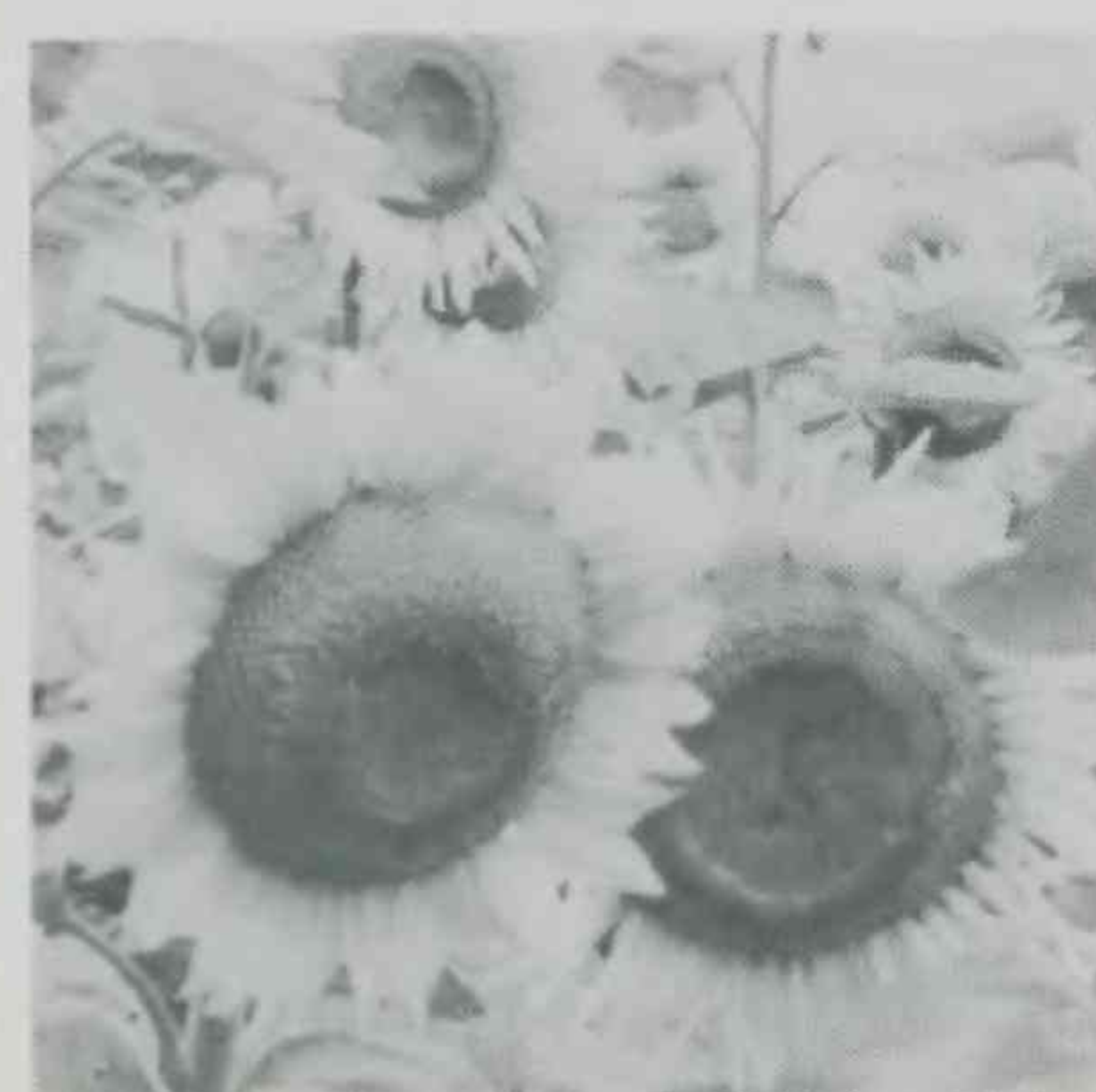
At year's end, US corn prices had begun to recover, owing to a rundown in stocks under the generic certificate programme. However, concern had been expressed about the possibility of the US Export Enhancement Programme being extended to grain sorghum. This could threaten Australia's export markets in the Pacific region.



The maize industry

Maize production was expected to total 108 000 t, down 37%. This was due mainly to maize plantings amounting to only 45 000 ha compared with 63 223 in 1985-86.

In north Queensland, the Atherton Tableland Maize Marketing Board's estimated intake was 21 000 t, down 25%.



The oilseed industry

The area planted to the two major oilseed crops (soybeans and sunflowerseed) declined considerably. Soybean plantings at 31 000 ha were down 18% and sunflowerseed plantings fell 29% to 105 000 ha. Dry weather during both the planting and growing stages contributed to reduced yields. Sunflowerseed production fell dramatically to an estimated 55 000 t compared with 97 700 t. Soybean production, at 38 000 t, was well down on the 52 800 t produced in 1985-86.

Depressed sunflowerseed prices contributed to the reduced area planted. Soybean prices showed some recovery, with a strong demand for soybeans for full fat meal. A premium of up to \$10 t existed for beans suitable for processing for soyflour.

Australian oilseed prices continued to be influenced by world prices, particularly

for soybeans. The movement of the \$A against the US\$ gave some protection against low world prices, which are usually denominated in US\$.



The peanut industry

The peanut crop was slightly up owing to increased plantings. An estimated 43 300 t of peanuts were produced from 34 600 ha, at an average yield of 1.25 t/ha. In 1985-86, 41 336 t had been produced from 28 363 ha at an average yield of 1.46 t/ha. Exceptionally dry conditions contributed to reduced yields and quality in the South Burnett region. Yields and crop quality continued to improve on the Atherton Tableland in north Queensland.

The 1986-87 peanut crop experienced high incidences of cylindrocladium black rot (CBR) and aflatoxin, which led to the Peanut Marketing Board and the DPI reviewing crop diseases and research projects.

The Peanut Marketing Board paid a first advance of 38c/kg and an interim payment of 5c/kg for deliveries to the 1985-86 pool. The 1985-86 pool was forecast to return about 57c/kg before deduction of levies. The Board had paid a first advance of 40c/kg for the 1986-87 pool.

International peanut prices fluctuated greatly in 1986-87. A forecast reduction in the US peanut crop led to the price of US 40/50 runners reaching US\$1,700/t CIF Rotterdam in August 1986. However, a normal US crop saw this price decline to US\$700/t by March 1987. Increased availability of peanuts from China, Argentina and Malawi contributed to an oversupply of peanuts and depressed international prices. Oversupply continued to be the medium-term outlook for the international peanut market.



The navy bean industry

The navy bean industry had a difficult 1986. Most districts experienced less-than-favourable growing conditions, owing to inadequate rainfall during mid to late crop development. This reduced the yield potential, with an estimated production of about 6500 t. However, combined with a carryover of 900 t from the 1985 season, this was sufficient for domestic requirements.

The Navy Bean Marketing Board paid a first advance of 45c/kg on canning-grade beans, with a residual payment of 22c/kg expected. At different times during the season, a cash-out option based on 15c/kg was also offered on canning grade beans.

Plantings for 1987 were estimated at more than 12 000 ha, an increase due to the Board's negotiating a three-year agreement to supply navy beans to the United Kingdom. Dry conditions had affected yields, with a total production of 10 000 t expected. The Navy Bean Marketing Board had announced a first-advance payment of 50c/kg for canning-grade beans from this crop.

The Commonwealth Government announced its decision on the IAC inquiry into vegetable and vegetable products. In regard to navy beans, the decision was that the shortfall by-law arrangement be ended and that the tariff applying be reduced from 25% to 2% by 1 January 1991.



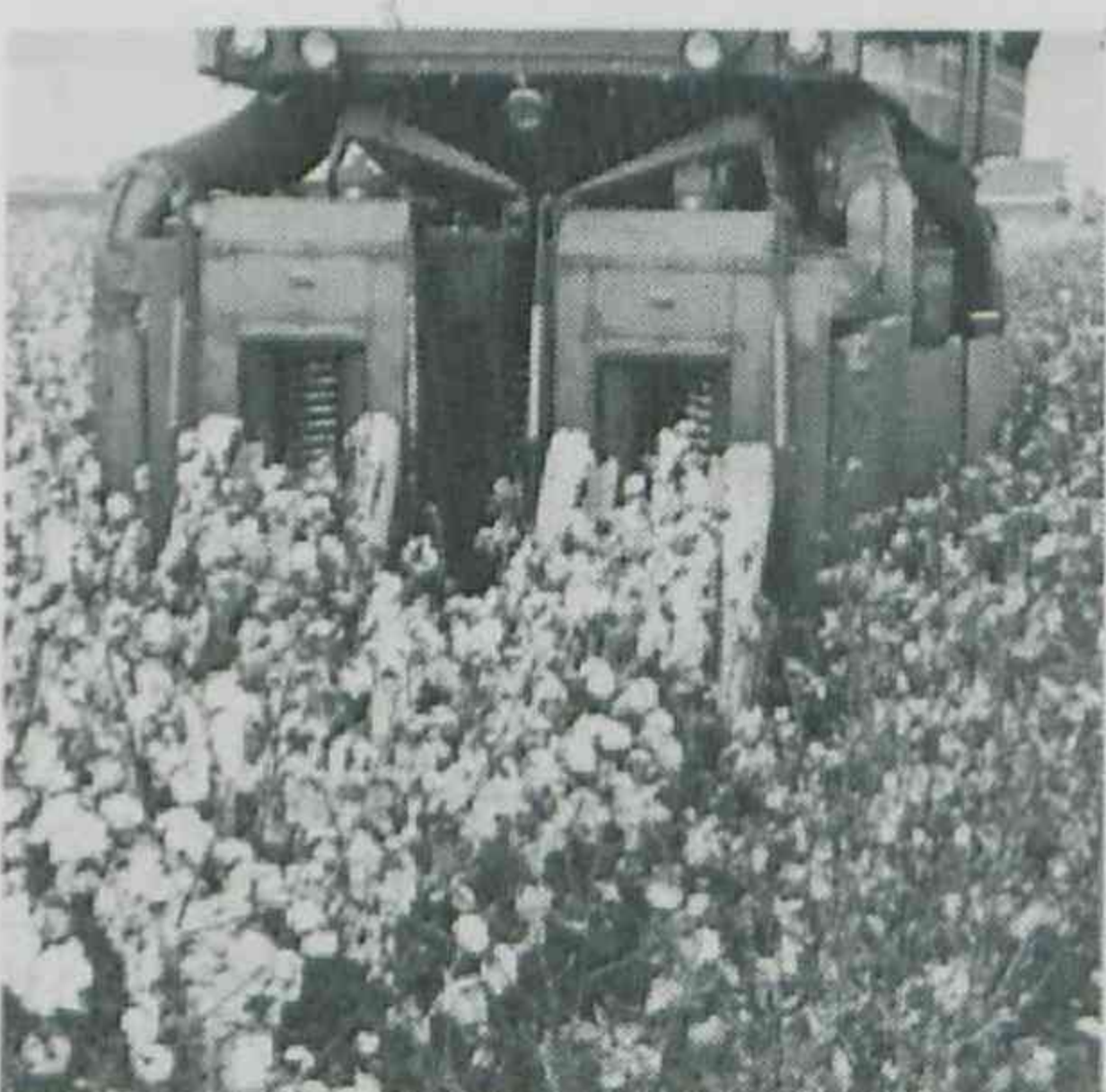
The rice industry

Production from the two rice harvests was expected to be about 18 700 t, about 38% above the 1985-86 figure.

The summer rice harvest was 10 200 t, with the Burdekin district supplying 5900 t and Mareeba the balance. This was a return to the usual production level of about 10 000 t after a poor 1985-86. The improvement resulted from higher yields and the release of the new lodging-resistant variety Lemont.

A total production of about 8500 t was expected from the winter harvest. Yields had been generally good, unlike the previous corresponding crop, which had been badly affected by bacterial leaf blight, especially in the Mareeba area.

Returns to growers for the summer crop were estimated at about \$210/t. As a result, production was expected to increase further, which might make some surplus available for export in 1988. The opening of the Burdekin Falls dam was likely to encourage further plantings.



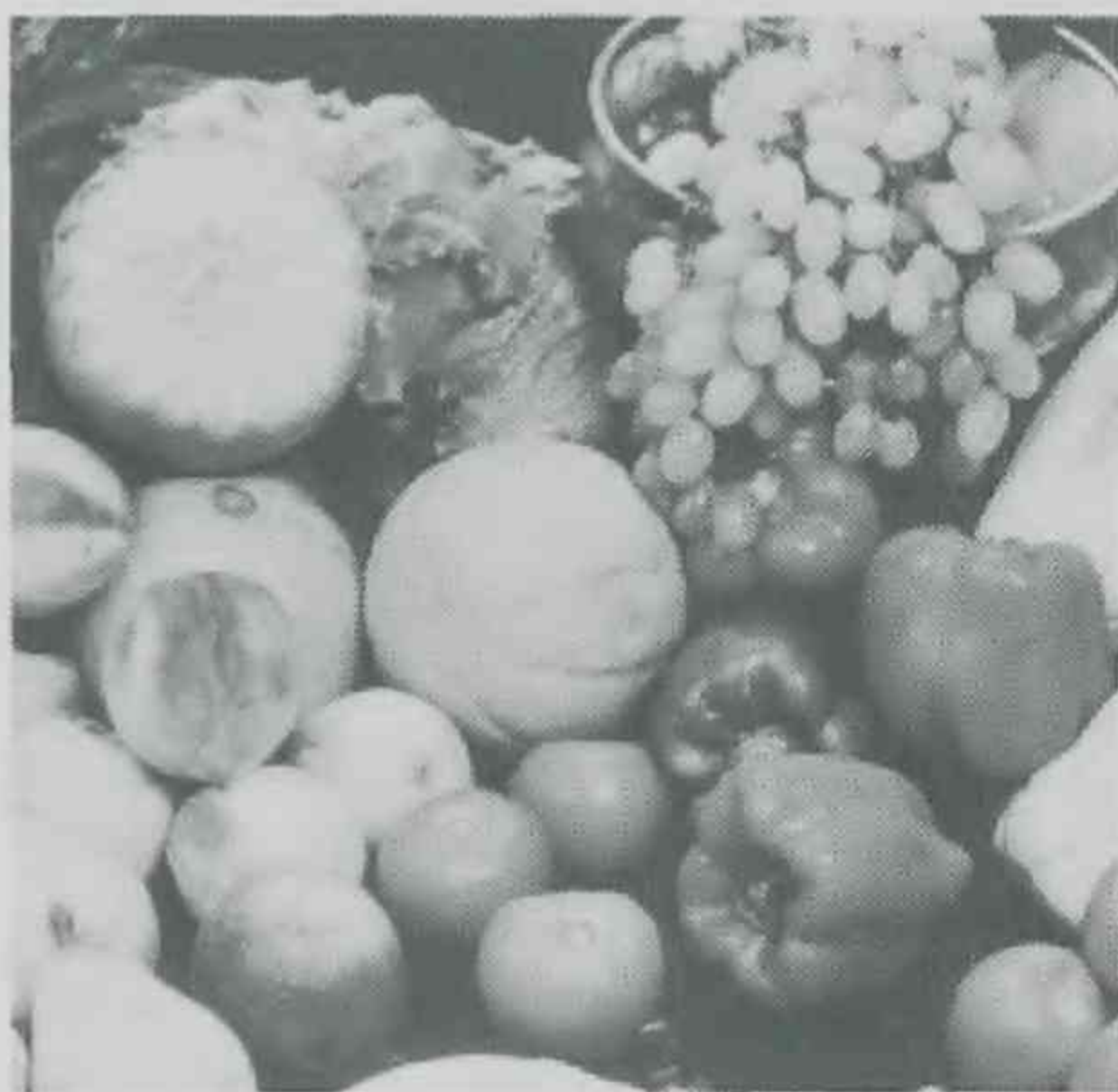
The cotton industry

Queensland ginned lint-cotton production declined to about 130 000 bales compared with 188 000 bales in 1985-86 and the record 211 000 bales in 1984-85.

Reduced plantings were due mainly to a world cotton-price downturn in mid-1986, stemming partly from the market-oriented provisions of the US farm legislation in relation to cotton. Futures prices dropped to a low of US 38c/lb at that time. Later, the cotton market recovered substantially, with futures prices in June hovering around US 70c/lb.

The Cotton Marketing Board completed the re-development of its oil-milling facilities at Eagle Farm to provide a processing capacity of 50 000 t of cotton seed annually.

For the 1987-88 season, the Cotton Marketing Board was offering marketing options to its growers to allow them to market a proportion of their expected crop under alternative pricing arrangements. These included a fixed- or cash-price option, an 'on-call' (basis) option and a guaranteed minimum-price option. The Minister for Primary Industries, Mr Harper, announced that amendments to the Primary Producers' Organisation and Marketing Act would be introduced in State Parliament's next session. The necessary provisions for the operation of such options began on 11 May.



The fruit and vegetable industries

Preliminary gross value of production figures indicated that total gross value of horticultural production was about \$410m, up 16%.

In recent years, an interest in developing new horticultural crops, particularly in north Queensland, has characterised the Queensland horticultural industry. This, in turn, has led to greater attention being paid to market-development strategies for both domestic and export markets.

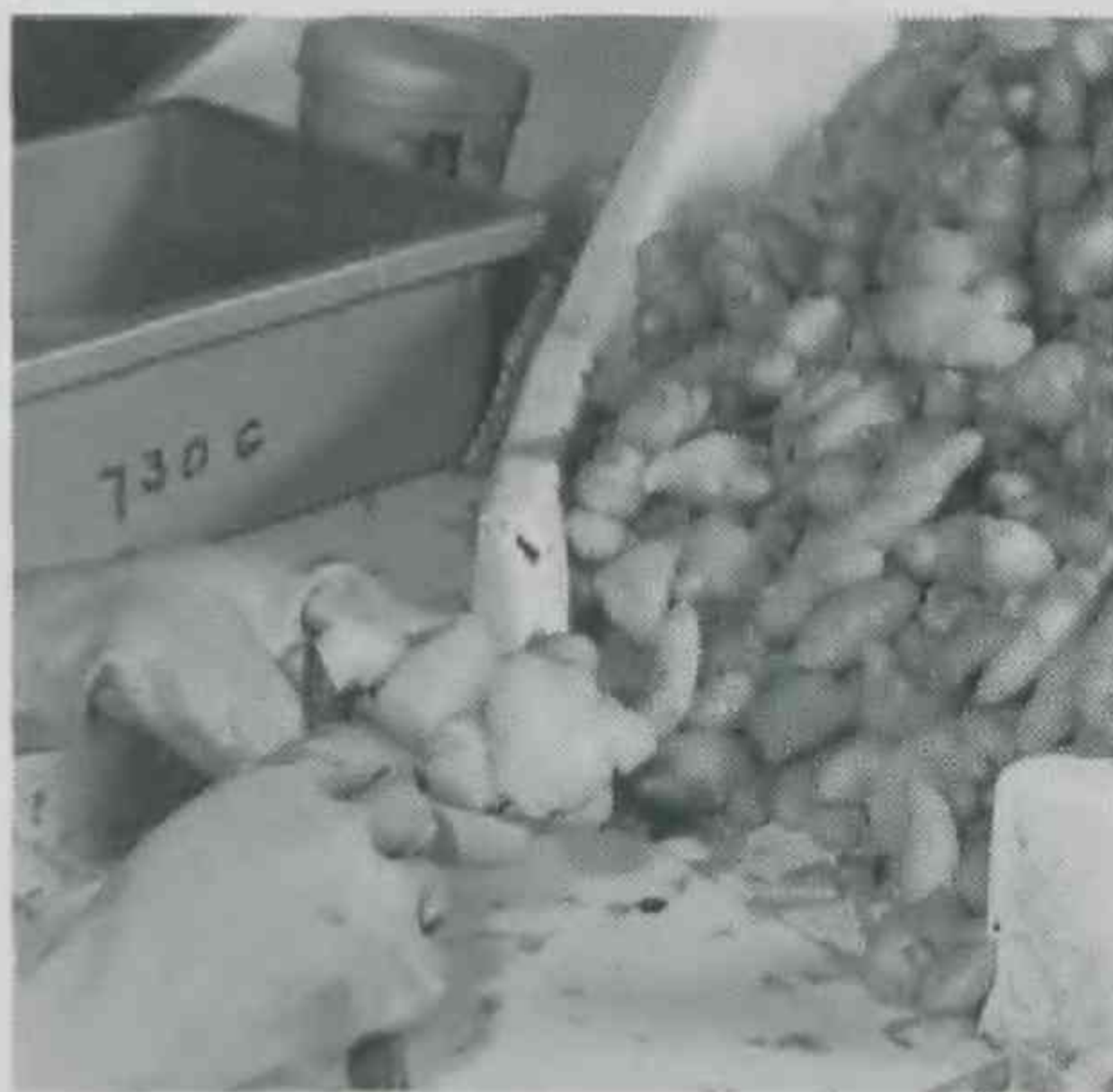
The Queensland Government has actively encouraged this development. In May, it announced the formation of a 12-member Queensland Horticultural Export Council, under the chairmanship of Mr V. B. Aldrich, a former CSR sugar division general manager and an acknowledged export-marketing expert, to coordinate the export activity of Queensland growers and exporters in key markets.

After an Industries Assistance Commission inquiry, the Commonwealth Government announced tariff levels on imported vegetable and vegetable products. Under new tariff arrangements announced on 7 May, fresh-vegetable imports would only be dutiable at minimum rates (either nil or 2%) while imports of processed vegetables would be dutiable at 10%. The import prohibition on potatoes was lifted.

The Queensland vegetable industry did not greet the decisions enthusiastically, because imported product would now become more competitive with local product, putting the local growing and processing industry under pressure.

The Queensland industry extensively discussed the Commonwealth Government's proposals to establish national industry bodies, including an Australian Horticultural Corporation to coordinate export marketing nationally, a Horticultural Policy Council to provide policy advice to the Commonwealth Minister, and a Horticultural Research and Development Corporation to coordinate and fund industry research.

The Queensland industry remained unconvinced that the first two proposed Commonwealth bodies were necessary and feared the duplication of activities currently carried out by State bodies.



The ginger industry

The Buderim Ginger Growers' Co-operative Association Limited's 1986 intake was 3023 t, compared with 3341 t in 1985.

With an expansion in the area planted to ginger, the expected factory intake for the 1987 season was 3700 t.

Export sales increased to about 60% of total production. (The Co-operative has 40% of the world market for ginger preserved in sugar and between 80 and 90% of the premium ginger market.) Export sales of green ginger continued to show potential, and the market for fresh ginger remained steady.



The tobacco industry

Tobacco sales to the end of May accounted for 70% of the 1987 State marketing quota of 7 723 197 kg at an average price of 542c/kg, 8c/kg above the minimum average reserve price of 534c/kg. The total value of tobacco-leaf production for the 1987 selling season was expected to be about \$41.5m.

Growers' 1987 quotas were set at about 4% above their 1986 selling entitlements, with 1988 quotas being set at the 1987 level.

Further tobacco-quota transfers, amounting to 23 054 kg, occurred from New South Wales. This compared with 41 571 kg in 1985-86 and 390 615 kg in 1984-85, when transfers first occurred.

An Industries Assistance Commission inquiry was being held into the tobacco growing and manufacturing industries to address, among other things, the stabilisation arrangements operating in the Australian tobacco industry.

Animal industry highlights

The meat industry

Smallgoods now account for more than 30% of the total amount of meat produced in Australia. Many processors are continuing their large investment in new developments in the smallgoods industry. DPI staff have been connected closely with these developments and, in particular, have advised on hygiene and design matters that have led to higher quality products.

Butchers and beef producers discussed meat quality and marketing issues at nine forums conducted by DPI officers, with help from the CSIRO and the Livestock and Meat Authority of Queensland.

As a result of continued close liaison with the National Heart Foundation of Australia, the DPI's veterinary public health branch organised and financed the concept and art work for a set of six 'Heart Food' posters, which the Foundation used in an Australia-wide promotion. They depict meat, cereals, fruit, vegetables, fish and low-fat dairy products as components of a healthy balanced diet. The Livestock and Meat Authority of Queensland contributed to the cost of printing the posters.

The DPI was assessing the best ways of handling meat to give maximum palatability. The combined effects of electrical stimulation, tender stretching, ageing, freezing rate and methods of thawing and normal household conditions were being evaluated.

The cattle industry

The upsurge in the use of feedlotting as a management practice has led to a comprehensive extension package on feedlotting strategies. The package consists of a series of information items on management procedures, rations and economic implications and is available in a combination of booklet, video cassette and tape-recording.

Simulation management of cattle by computer has been developed for the major pasture communities where cattle are raised in Queensland. The relative importance of different management goals can be ascertained by using actual data that allows an economic (or other) comparison of each goal. The simulations have revealed the importance of various management strategies as determinants of economic returns. Many variables have been studied and the 'model' is becoming comprehensive.

A listing of research findings, extension messages and industry trends was developed for the beef industry and distributed as a 16-page colour beef supplement in the *Queensland Graingrower* newspaper and in the *Farmers and Graziers* magazine. Contributions were received from the Cattle Council of Australia, Australian Meat and Livestock Corporation, Aus-Meat and the Queensland Department of Primary Industries.

A variety of diseases were identified as causing cattle losses. Botulism was responsible for deaths in several areas, and, in one particular case, 14 of 65 Friesian cows died. The rapid diagnosis of an infectious bovine rhinotracheitis outbreak in a feedlot showed the value of a recently developed diagnostic test. Tick-fever outbreaks were investigated on 81 properties from which a total of 141 deaths were reported.



Brahman cows on a property near Roma. The DPI's beef cattle husbandry branch is fostering the use of Brahman-cross cattle in south-west Queensland.



A DPI laboratory assistant tests serum samples from cattle for antibodies to *brucella abortus*. In 1986-87, DPI laboratories processed 1.5m samples in the brucellosis eradication scheme.

Brucellosis and tuberculosis

The feedlotting of cattle removed in destocking operations continued. This procedure has provided additional cattle to the meat industry and converted relatively low-value cattle into a quality product for the local trade and export market. Savings are channelled back into the compensation fund.

A total of 450 km of strategic fencing was erected in the Gulf country to control cattle and help with destocking.

The sheep industry

WOOLPLAN, the national performance recording system for stud Merino sheep, was introduced. Eight Queensland studs took part in the scheme in the first year, after DPI representations. DPI officers were tailoring selection indices to individual stud breeders' requirements.

'Lice Buster', a programme to control the sheep body louse, was being tested in the Warwick district. The programme is based on groups of neighbouring producers developing, implementing and monitoring cooperative control programmes.

A multi-disciplinary cooperative project was underway to investigate low reproduction performance in sheep flocks in central and north-west Queensland. Called 'Lamb Boost', the project was introduced to 10 properties for detailed investigation.

The goat industry

A practical system of exposing cashmere goats to periods of continuous light to improve production was developed. The system exploits the findings of previous research, and results indicate a 60% productivity increase.

Research showed that shearing cashmere goats twice a year in April and July gave marked increases in cashmere production. Further research was seeking to exploit the consequences of this finding.

Arid Zone Research Institute

A sheep and wool extension officer was stationed at Longreach to service producers in that district as part of the DPI's commitment to develop the Arid Zone Research Institute. Four other staff from the division of animal industry were to begin duties at the Institute soon and would be involved with animal-production research and extension in the arid environment.

The pig industry

DPI officers conducted pig AI workshops for producers at 12 country centres, emphasising the role of AI allied with performance testing in pig herd improvement.

SOWTEL, a new computer program, replaced a pig husbandry and a financial assessment program by combining the two and offering the option of analysing either, separately. A further option to forecast piggery productivity and profitability 12 months ahead will be added.

The poultry industry

The need for increased throughput of broilers and reduced 'breaks' between batches increased the pressure on growers to maintain management standards, environment control and flock health.

Poor day-old chick quality and a range of viral and bacterial infections were responsible for production losses in meat-chicken flocks. A lentogenic strain of Newcastle disease virus was isolated from flocks on several properties.

Poor egg quality continued to be a source of inefficiency in production and a concern in consumer acceptance. Investigations included the candling of eggs to clarify problem areas, evaluating factors affecting candling efficiency and helping producers and servicemen to obtain the knowledge and skills to solve egg-quality problems. The particular difficulties in maintaining freshness of eggs in Queensland's tropical and subtropical climates have required an extensive evaluation of storage methods and of the worth and practical application of egg oiling.

DPI poultry officers used their computer skills to improve farm efficiencies in such areas as management, formulating least-cost diets, matching diet specifications to feed intake and analysing total on-farm costs and performance.



In 1986-87, DPI veterinarians carried out many field autopsies on poultry. These gave producers early diagnoses of specific diseases and enabled them to implement early treatment and prevention programmes.

Brands

Entry of brands and earmark records into the Computer Operated Brands Recording and Acquisition (COBRA) project was completed. An equipment-upgrading programme and further development of programmes to improve the service provided to industry were nearing completion.

Enzootic bovine leucosis

The dairy industry continued to support the voluntary accreditation scheme. The number of accredited-free herds increased from 53 to 135. About 85 000 blood samples were tested and nearly 5000 reactors detected. To date, 1800 herds had been tested and more than 350 000 blood samples processed at the DPI's Oonoonba (Townsville) and Yeerongpilly (Brisbane) veterinary laboratories.

Residues

The DPI tested more than 4000 samples from beef, sheep and pigs at slaughter. This continuing survey supplemented the Commonwealth survey, which tested 6000 samples from beef, sheep, pigs, eggs and honey. Samples from both surveys were tested for a range of chemicals, including organophosphates, organochlorines, heavy metals, zeranol, sulphonamides and inhibitory substances.

Export testing

More than 76 000 laboratory tests were performed on 27 000 animals to meet export requirements. Most of these were cattle destined for Japan. Many meat samples from feral pigs were tested for trichinosis to meet import conditions for the European market.

Disease control schemes

Cattle-tick control was helped by dry seasonal conditions, which reduced tick numbers. In the Maxwellton Special Area, only six properties were infected at the end of May. Major reviews of cattle-tick areas and movement conditions, both interstate and intrastate, were undertaken.

An emerging disease of goats (caprine retrovirus) was causing concern to Queensland goat owners. A survey involving 75% of milk goat herds found that about 25% of the goats tested were infected with this serious disease for which effective control strategies and appropriate tests are available.

The sheep brucellosis accreditation schemes for the Merino and British breed stud societies progressed, with accreditation status given to five Merino stud flocks and re-accreditation to four Merino and 21 British breed flocks.

The control programme to reduce significantly the genetic pool of Pompe's disease in Queensland stud Brahman cattle was released to the stud industry. After the Australian Brahman Breeders' Association adopted the programme, eight studs joined the scheme.

Stock poisoning

All arsenical products were withdrawn from sale on 30 July 1986. Forty-five bullocks died at Mungallala after gaining access to old sheep-dip powder. Stock losses were also reported from poisoning with urea, lead, organo-phosphates and warfarin.

Poisonous plants, including lantana, button weed, prickly paddy melon, cassia and those causing oxalate poisoning, continued to cause stock losses in several regions.

Green Cestrum (*Cestrum parqui*) is toxic to cattle, sheep, horses, pigs and poultry. The primary injury site is the liver. Scientists at the DPI's Animal Research Institute, Brisbane, isolated a pure toxin from the plant. Structural determination of the chemical toxin was a continuing joint project between DPI scientists and Cambridge University (UK) research chemists.

Animal disease diagnosis

Clinical analysis of samples taken from organs and body fluids of farm animals provides the diagnostician with comparative data to better define disease status. As part of the diagnostic service, the DPI's Animal Research Institute, Brisbane, performed 26 000 biochemical assays. The information generated from these samples, together with field and meatworks diagnoses, were being integrated in computer format to enable disease problems to be identified early and to help research and extension priorities.



On farms and at special workshops, DPI officers teach pig and poultry farmers 'hands on' computer skills using DPI developed software.

A number of high-technology developments were progressively incorporated into laboratory operations. They included the use of monoclonal antibodies in a new test for ephemeral fever virus; the use of an Enzyme Linked Immuno-Sorbent Assay (Eliza test) to improve the diagnosis of botulism by detecting toxins produced by *Clostridium botulinum*; and the development of immunoassays to eliminate the need to culture *Mycobacterium bovis*, the causative agent of bovine tuberculosis. Other developments included the production of highly sensitive and specific DNA probes for diagnosing chlamydia organisms, which cause disease in animals, birds and man; the development of immunofluorescence and immunoperoxidase tests for infectious bovine rhinotracheitis; and the study of techniques for typing *Haemophilus parazallimarum*, the cause of infectious coryza in poultry.

A hereditary fatal nervous disease of young pigs was diagnosed in Queensland piggeries for the first time. The disease, cerebellar cortical abiotrophy, occurs overseas and appeared to have been introduced by recent pig imports into Australia.

A rare inborn error of metabolism of the urea cycle, in which citrulline accumulates in body fluids, was diagnosed for the first time in Queensland. It had caused the death of 20 neonatal Friesian calves and could be traced to the importation of genetic material from overseas.

Progressive infectious atrophic rhinitis of pigs was diagnosed for the first time in Queensland after the introduction of imported breeding stock. The disease is common in Europe and North America and was first diagnosed in Western Australia in 1984, in South Australia in 1986, and in New South Wales in 1987. The disease can reduce growth rate and is an important economic disease overseas.

Research in animal industries

A novel research programme was begun to reduce cattle handling costs in north Queensland. Initial emphasis was being placed on improving mustering methods in extensive areas by using traps and developing systems for automatically weighing and/or drafting cattle. Better cattle-handling techniques, allowing for greater cattle control, can enhance graziers' adoption of new technology, including water medication and automatic delivery of insecticides.

Consumer demand led to a research programme designed to produce consistently tender beef. Tenderness is largely due to muscle sugars (glycogen) being mobilised after death. Before slaughter, cattle 'burn up' these sugars during transport and handling. Queensland cattle are often subjected to long walks (mustering) and long hauls (transport) on the way to the abattoir. These processes deplete glycogen levels. DPI research has shown that glycogen levels can be replenished at the abattoir by giving cattle access to sugary water for two days before slaughter.

The effect of different planes of post-weaning nutrition on subsequent meat quality was being studied at the DPI's Brigalow Research Station, Theodore. This programme is designed to identify any critical periods during which poor nutrition may affect yield of saleable beef and tenderness.



A DPI sheep and wool branch officer demonstrates a dispenser that provides urea in sheep's drinking water. This medication system was developed by DPI officers.

An improvement in northern beef-herd nutrition was the aim of a research project which involves the testing of specific supplement formulations for cattle. Aspects of rumen physiology, particularly the use of rumen modifiers to increase feed-utilisation efficiency and improve growth, were being studied. Results have shown that rumen modifiers can significantly improve liveweight gains of cattle on molasses-based production rations and dry-season supplements.

Deaths in young lambs are a significant industry problem. This was being researched through a study of the role of foeto-toxins of plant origin. These toxins can be identified as constituents of certain plants which, when ingested, detrimentally effect the developing lamb *in utero*.

Further research into blowfly-vaccine production saw sub-fractions of larvae successfully used as antigens. Current studies were seeking to refine the antigen further as part of the overall process to develop a vaccine.

The delivery system for administering methionine to grazing sheep was still being tested in response to industry's interest in using the amino acid to increase wool growth. Recent high wool prices had further strengthened the need for research findings that enhance productivity. The use of this supplement was seen as one way to achieve this goal.

The use of polyethylene glycol to improve the productivity level of sheep on mulga diets was established. Further research was to be directed towards acquiring a cheaper product that retains the desirable attributes of the polyethylene glycol and meets practical requirements.

Severe growth-depressant and reproductive-depressant effects in livestock are caused by *Fungal toxins (mycotoxins)* produced as metabolic by-products of fungal infestation in grain crops. Mycotoxins were detected in significant concentrations in wheat and barley tillers infested with the fungus *Fusarium graminearum*.

Chicken meat industry investigations concentrated on the effects of dietary energy on the economics of egg production, on the nutritional value of weather-damaged wheat, and on aspects of lighting and temperature control in relation to performance. Meat-chicken breeder hens were selected for efficient production of settable eggs.

Husbandry research for the egg industry was directed at improving nutrition and management. Particular attention was paid to manipulating egg size by varying fat level in the diet, the effects of abruptly changing the protein source in laying diets and evaluating controlled feeding regimens during rearing of replacement pullets. Layers were also being selected for stability in egg size through the lay.

Weed-seed contamination of feed grains can seriously affect farm animals' performance and well-being. The significance of seeds of weeds that commonly contaminate crops was being evaluated in experiments with pigs and poultry.

Overseas projects

The DPI's Animal Research Institute and Tick Fever Research Centre, in collaboration with the Sri Lankan Department of Animal Production and Health, continued a project to implement control of tick-borne diseases of ruminants in Sri Lanka. An improved vaccination programme was expected to be implemented in Sri Lanka within 12 months.

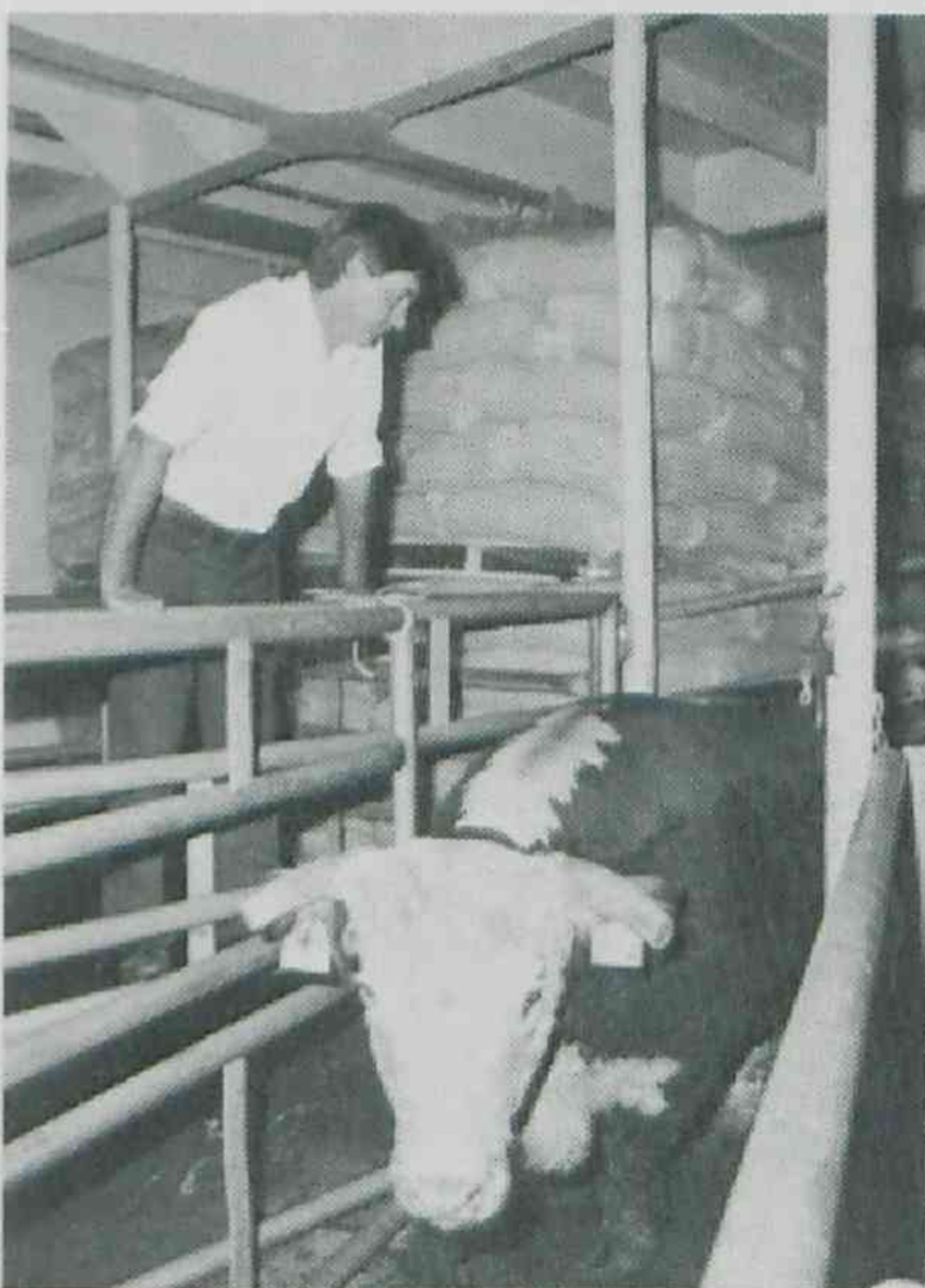
A project on malignant catarrhal fever in cattle, being undertaken by the DPI's Oonoonba Veterinary Laboratory, Townsville, in collaboration with James Cook University and Indonesia, was concluded. Although the aetiological agent was not positively identified during the project, useful technology was developed and an insight into the epidemiology of the disease was achieved.

Quarantine

Programmes to promote community awareness of quarantine matters to protect livestock industries against devastating exotic disease and to participate in the monitoring of conditions for the export of cattle were continued.

Highlights included:

- monitoring of pests and disease in the Torres Strait and Cape York Peninsula areas;
- developing a national training programme for agricultural quarantine staff;
- importing bovine semen from Europe and, in particular, from Sweden;
- participating in the Shipboard Veterinary Clinical Service, which is designed to ensure that the escalated live-cattle export trade with Japan is maintained;
- implementing major extension programmes throughout the State to promote the activities of an effective quarantine service;
- being involved in developmental planning for the new import/export air cargo terminal at Brisbane airport; and
- releasing of the Senate Standing Committee on National Resources Report on the adequacy of quarantine activities in the Torres Strait area.



A quarantine service veterinarian gives a clean bill of health to beef cattle destined for the lucrative export live cattle market in Japan.

Dairy industry highlights

Queensland dairy industry

Milk production declined by 0.7% to 600m L for the year ended 31 March. The lower production was due to prolonged dry periods in a number of dairying regions. Of the total milk received, 50.6% was bought as market milk compared with 48% in 1985-86. The average price paid to producers for all milk received, including deferred payments, was 27.3c/L compared with 24.2c/L in 1985-86 and 22.4c/L in 1984-85. Gross average payment for market milk was 40.2c/L, with a range of 34.66c/L to 42.18c/L. The price of milk delivered to Brisbane for use within the Brisbane milk district remained at 42.18c/L.

Gross payment

Gross payment to producers for manufactured milk averaged \$3.52/kg butterfat (14.1c/L) for the year. The monthly rates paid by individual processors ranged from \$1.95/kg butterfat (7.72c/L) to \$4.85/kg butterfat (19.4c/L).

Consumer preference

Consumer preference for cheese varieties has changed dramatically. Over the last 10 years, the percentage of non-cheddar cheese sales has expanded greatly, highlighting a greater sophistication in consumer requirements and reflecting the ethnic community's growing influence in the marketing area. In 1986-87, fancy cheese production accounted for 38% of total cheese production, more than double that of a decade ago.

New branch formed

The dairy husbandry and animal breeding branch was formed on 29 January, replacing the dairy cattle husbandry branch and part of the dairy field services branch. The new branch has an altered purpose and function.

Australian Friesian Sahiwal

The Australian Friesian Sahiwal (AFS), a breed of tropical dairying cattle that the DPI is successfully developing, was rapidly gaining world wide acceptance on the merits of its performance. In the 6 months to 1 June, enquiries for almost 10 000 head of AFS cattle came from tropical countries, including Thailand, Malaysia, Kenya, Saudi Arabia, Pakistan, India and China.

Export semen sales totalled 23 624 doses of which 51.3% were AFS.

Embryo transfer is being used in association with the AFS breed development programme at the DPI's Warrill View Research Station, near Ipswich. In 1987, more than 100 AFS calves were expected to be born by this method. The 1988 target is 200.

Genetic development

An import agency was arranged with Sweden and Denmark to market semen from Swedish and Danish Red breeds. This was the first Australian commercial contact with Scandinavian countries and resulted in good semen sales through Wacol.

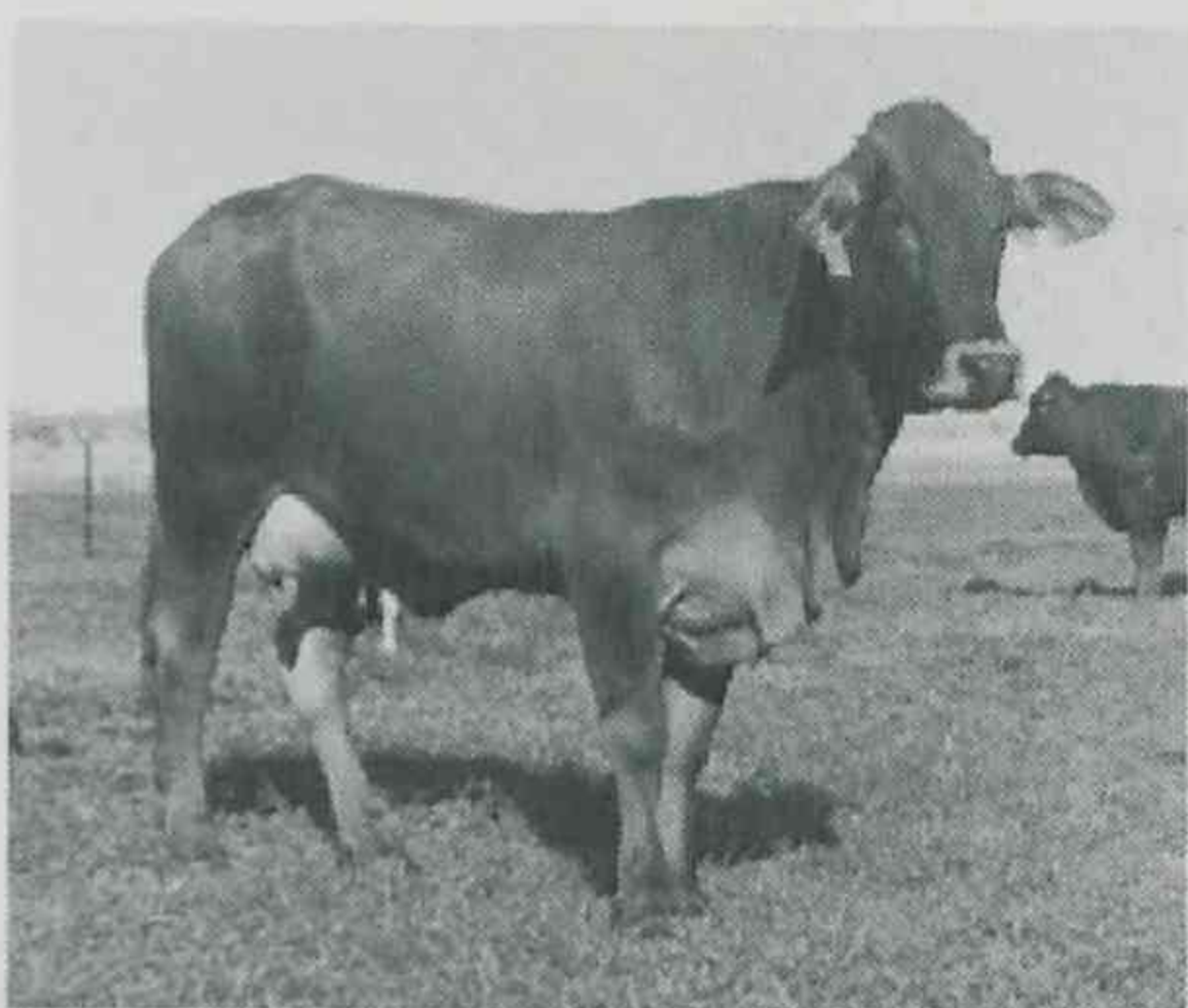
In May a total of 225 animals were at Wacol and Ormiston (236 in 1985-86), including 162 animals at the Wacol AB Centre, 40 at the Wacol Dairy Herd Improvement Laboratory and 23 at the Redlands AI Export Centre, Ormiston.

A total of 314 464 doses of semen for unrestricted use were placed in storage, including 52 031 doses from privately owned bulls. A total of 253 383 doses were distributed, compared with 255 627 doses in 1985-86.

Of the semen distributed through Wacol AB Centre, 203 643 doses (80%) were locally produced and 20% originated from other centres. The centre has more than a million doses of semen in storage. A computerised inventory control system was operating satisfactorily.

Inseminator training

Of the 282 stock owners trained to inseminate during 26 courses, 158 were beef producers. This brought to more than 2300 the total number of producers that the DPI has trained in the practice of artificial insemination in cattle.



The AFS breed, a tropically adapted dairy breed, is rapidly gaining world-wide acceptance. A multiple ovulation embryo transfer (MOET) programme at the DPI's Warrill View Research Station, near Ipswich, is being used to rapidly increase genetic improvement and multiply cow numbers of superior animals for export.

Artificial insemination of pigs

Pig artificial breeding, using a liquid semen service, began in August. A total of 1414 doses of chilled semen from top Queensland central tested boars were distributed to 92 Queensland and interstate clients.

An agency was arranged with an AB centre in Leduc, Alberta, to import frozen Canadian boar semen for sale in Australia. The first shipment was expected to be consigned in July 1987.

Embryo transfer

Embryo transfer of elite cows for bull breeding continued to be well accepted and had resulted in good cooperation from stud breeders in the Holstein-Friesian and Illawarra breeds.

Fifty-eight pregnancies were produced from 16 flushes on 14 donor cows. Of the 130 embryos flushed, 80 were transferred giving a transfer success rate of 72% compared with the 1985-86 success rate of 68%.

Marketing genetic improvement

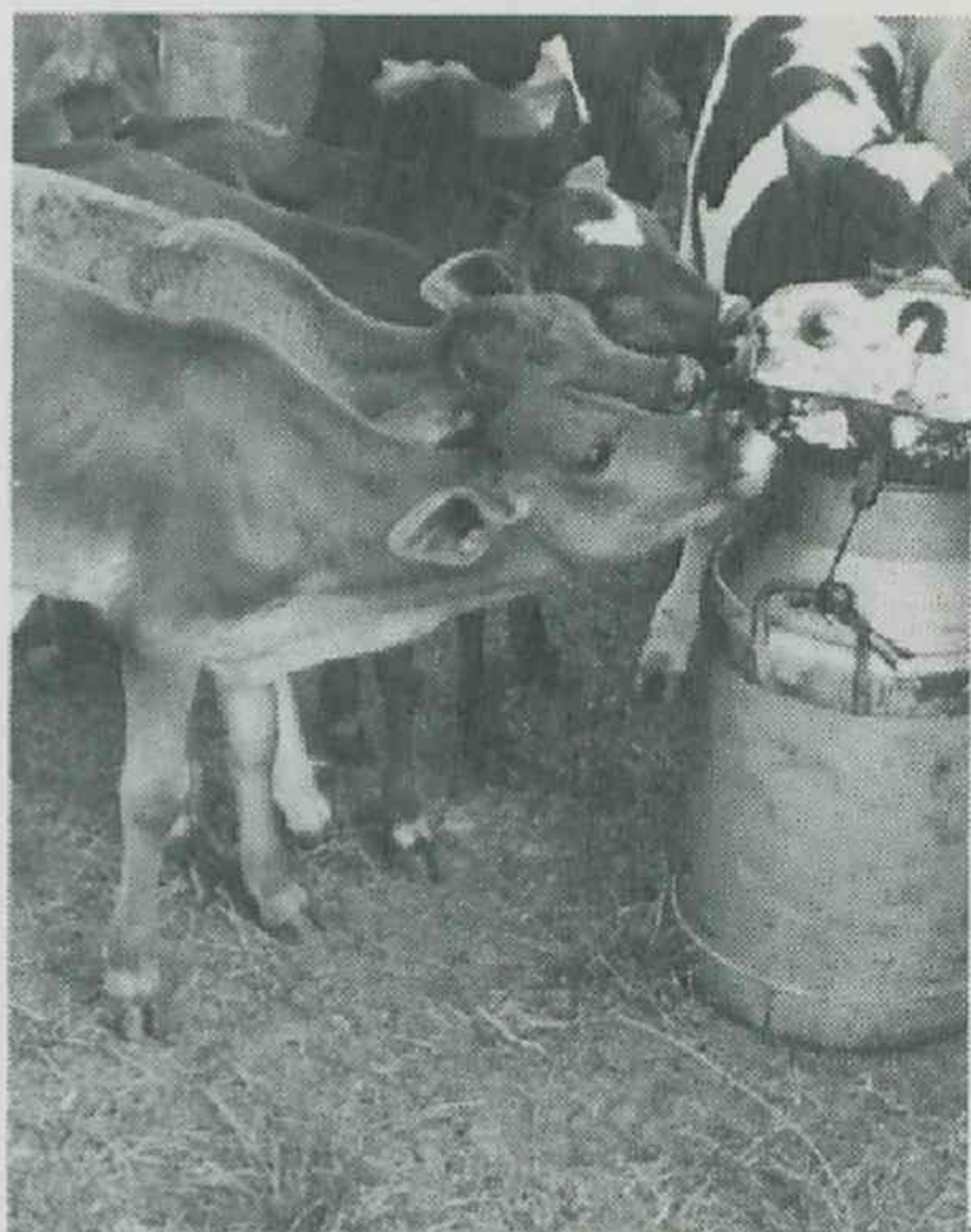
Bull proving has undergone a progressive and healthy expansion. The Wacol AB Centre had 55 bulls in its Holstein-Friesian proving teams compared with seven in 1981 and 28 in 1985-86.

Wacol AB Centre was taking steps to become Australia's number one AB centre. These are summarised below.

- Thirty-four agencies were operating throughout Australia supported by a national marketing scheme.
- Wacol Holstein-Friesian bulls are being bred so that their daughters have a higher protein value in their milk. Wacol is Australia's only AB centre that has had a protein-testing service available to all clients through the herd-recording service. This gives the Wacol AB Centre a distinct advantage when selecting high protein levels.
- Wacol is offering semen from European Red breeds, including the Swedish Red, the Danish Red, the Angler, and the Blended Red and White Shorthorn. These breeds have relatively high protein levels.
- A Holstein-Friesian bull-proving team (spring 1987) is being used, with an estimated genetic value equal to, or better than, that of any other team on offer in Australia. This should ensure that Wacol commands a high percentage of the proven bull market in four years' time.
- The Wacol AB Centre is importing a Canadian-bred bull in early 1988. On current information, this is the best genetic material to be imported into Australia for the dairying industry.



A sample of the marketing brochures that the DPI's Wacol AB Centre produced for its clients in 1986-87. There are now 34 agents throughout Australia marketing Wacol's herd improvement services.



Correct calf-rearing methods have an important and long-lasting effect on the future production of dairy cows. Here AFS and Holstein-Friesian calves are feeding from a 'calfeteria'—a multiple suckling system used to rear strong, healthy calves.

Herd production recording

The high demand for herd-recording services continued: 897 members were using the herd recording service (370 in the Farmer Own Sampling scheme and 527 using a DPI recorder). Thirty-seven per cent of Queensland dairy farmers were using the herd recording services. In 1985-86, 72 180 cows completed lactations and their average yield in 276 days was 3638 L of milk and 142 kg of butterfat.

The Farmer Own Sampling (FOS) scheme again increased in popularity; 41% of members using the herd recording service were using the FOS scheme compared with 38% in 1985-86 and 32% in 1984-85.

The Wacol Herd Improvement Laboratory processed 750 000 samples of milk from individual cows.

Herd management scheme

Use of the herd management scheme remained steady with 240 members, 180 of whom were cooperators in the bull proving scheme.

Financial management services

High interest rates and lowering net returns from manufacturing products continued to plague dairy farmers and other primary producers. A growing number of dairy farmers asked for financial management help.

Dairy husbandry and animal breeding branch was marketing Australia wide its own microcomputer software: a financial management programme (FARMACC) and a herd management programme (HERMAN).

Dairy cattle research

Research programmes at Mutdapilly and Kairi research stations continued to demonstrate the potential of pasture for milk production in Queensland. Both stations were studying irrigated and dryland forage systems, which were producing well above district averages for milk production.

In particular, Mutdapilly showed that forage systems maintain a high milk-production level throughout the year. It achieved this without irrigation and under drought conditions prevalent during much of the last 3 years.

On-farm research

Twelve large-scale 'on-farm' trials using nitrogenous fertilisers were being run in conjunction with Mutdapilly trials. Almost all of the farm resources were used and monitored. This type of research is breaking new ground in allowing a combined financial and technological interpretation of improved pastures and production methods.

Average herd production levels of 4600 L/cow were being recorded from pasture-based dryland systems, on and off research stations.

Fertilised grasses

Over the last three years, extensive research trials were conducted on farms in south-east Queensland and at Mutdapilly Research Station. Dramatic increases occurred in pasture yields and milk production when urea fertiliser was applied. Responses increased from 4 L of milk per kg of nitrogen (in the first year) to 7 L of milk per kg of nitrogen (in the third year).

Extension services

A comprehensive extension programme, with the theme 'staying on top', was geared to helping dairy farmers and the industry stay on top of costs and farm efficiently. It was launched at a seminar—attended by more than 300 farmers and dairy industry representatives—at Marburg in May.

Field staff continued to help farmers, on an individual or group basis, to overcome their problems and maximise profits.

Plant industry highlights



DPI plant breeder, Dr Michael Cox (right) and Rice Marketing Board chairman, Mr Lyndsay Hall, admire the upright stability of Lemont, a new short-statured rice variety released by the DPI in 1986 to replace the taller growing varieties, which suffered from lodging. (Photo courtesy of the Ayr Advocate, Ayr.)

Agriculture

A new maize hybrid, Sloan, for the Atherton Tableland was released from the Kairi Research Station breeding programme early in 1987. Sloan has a lower ear height, improved grain quality and resistance to tropical rust compared with the existing commercial hybrids.

Research has shown that Sloan and advanced experimental hybrids in the breeding programme can be grown at higher plant densities than the older commercial hybrids such as QK657. This results in yield advances up to 50% over the older hybrids.

In the tobacco-breeding programme based at Southedge Research Station, near Mareeba, resistance to the north Queensland race of blue mould (APT2) was transferred from the wild species *Nicotiana cavicola* and *Nicotiana* spp. Ravenshoe to the cultivated tobacco species *N. tabacum*. The resistant lines have similar leaf quality to the commercial cultivar ZZ100, although their yields are slightly lower.

The effect of planting time on the production of maize and soybean cultivars was the subject of crop research in the Burdekin River Irrigation Area. Soybean cropping was also studied at a range of plant densities. Results showed that yields of 10 t/ha of maize and 4.5 t/ha of soybeans are possible over a range of planting times.

The response of rice cultivars in the Burdekin to applied nitrogen fertiliser was investigated. Cultivars were found to vary in their response. With the recently released cultivar Lemont, applications of nitrogen fertiliser valued at \$50 increased yield by \$350.

Loss of fertiliser in gaseous forms has long been considered responsible for low efficiency of nitrogen applied to heavy clay soils of the Darling Downs. A sophisticated piece of equipment gaining world-wide attention was developed at the Queensland Wheat Research Institute, Toowoomba, to measure these losses directly and thereby identify management factors to minimise them.

Soil tests were developed to predict accurately the phosphorus and potassium fertiliser requirements in soybeans for diverse south-east Queensland soil types and environments.

Increasing interest in chickpea production in Queensland was supported by research on cultivars, with particular emphasis on disease control, and by an assessment of chickpea ability to provide nitrogen to subsequent crops in a rotation. Promising phytophthora-resistant lines with improved yield, seed size and plant height were identified. Chickpeas, when compared with barley, produced a yield increase in the following sorghum crop equivalent to that produced by the application of 100 kg N/ha. The benefits of prior chickpea crops were maintained even when up to 180 kg N/ha were applied to the following sorghum crop.

Reduced tillage fallow management and conservation cropping were being adopted in central, south-east and southern Queensland. Producers were being helped to develop and apply these new technologies.

Farming practices to improve the efficiency of irrigation and the use of fertilisers were developed in the Burdekin River Irrigation Area, the Emerald Irrigation Area, the South Burnett, the central Darling Downs and the St George districts.

The publication and dissemination of information was expanded. Of particular significance was the cooperation of agribusiness in producing booklets on farm management. Two booklets directed at Darling Downs farms, *Winter Crop Decisions* and *Summer Crop Decisions*, proved popular. Similar booklets are proposed for the Western Downs and Maranoa and the South Burnett.

New and beneficial technology was developed in a range of farm practices. These included efficient irrigation and crop-nutrition techniques for soybeans and cotton, pasture management practices for stylo shrubby legumes and the tree legume leucaena, and husbandry techniques for new grain legumes, crops, chickpeas and mung beans.

Computer-based decision support packages to help farmers make crop-management decisions were developed. Packages for wheat growers, cotton growers and soybean growers had been evaluated and were being adapted to farmer requirements.

A statistical technique for improving the selection efficiency of lines in plant-breeding trials was developed. In March, Queensland and NSW plant breeders and biometricians enthusiastically discussed the results of the technique's implementation in the barley breeding programme. In addition to subset selection, officers focused on managing field variability and the computerisation of breeding programmes.

Pasture Management

The *Stylosanthes* species continued to provide the major legumes for use in sown pastures over much of the State. This was so in northern areas, where Seca shrubby stylo and Verano caribbean stylo dominate; in central Queensland, where Seca shrubby stylo has proved a useful replacement for the earlier, more favoured Fitzroy cultivar; and in southern areas, where Oxley fine stem stylo and, in more favoured areas, Seca, are continuing to prove very valuable. After initial widespread collapses of stylo



Newly establishing stands of Inverell purple pigeon grass. This plant is rapidly becoming a valued new sown grass species for southern and central Queensland, being particularly well adapted to heavy clay soils.



DPI officers use portable computers to develop decision packages that help farmers decide when to irrigate crops such as cotton and soybeans.

cultivars to the disease anthracnose, these three cultivars have continued to maintain worthwhile field resistances.

In southern areas of the State, especially the heavy-textured soil areas, two recently released grasses, Inverell purple pigeon grass and Silk forage sorghum, attracted interest. They provided much of the pasture being sown on lands being taken out of cultivation.

Introduced pasture species were being tested at north and central Queensland sites. The most promising lines in the evaluation studies were being planted in large plots for animal performance on the pastures to be evaluated. Several recently released cultivars were included in this programme for testing in areas outside those for which they had recently been released. These include Wynn roundleaf cassia and Glenn jointvetch in north Queensland.

A study was implemented in the Upper Burdekin Catchment to assess the impact of present grazing management regimes on the run-off and soil erosion from the various soil types. Relationships between ground cover, run-off and sediment yield from 12 sites will be measured, and the effect of present management and the exclusion of domestic livestock assessed. Initial results suggest scope for a management programme involving regular spelling of paddocks over the wet season.

A grazing trial was established at the DPI's Brigalow Research Station, Theodore, in 1981 to compare the response of Biloela buffel grass, in combination with stylo species, to applied superphosphate on a brigalow/dawson duplex soil. Despite an outbreak of anthracnose disease shortly after the trial began, Fitzroy shrubby stylo added a further 29 kg/head liveweight over buffel grass alone, while Seca, free of anthracnose, resulted in an extra 45 kg/head liveweight gain over the buffel grass. The application of superphosphate at 200 kg/ha, while improving animal performance, did not give an economic level of increase in the trial. Seca shrubby stylo, on the other hand, gave a sustainable increase in production 5 years after planting, at a stocking rate of a yearling steer/2 ha.

Plantings of up to 100 ha of new and promising pasture plants, were established in demonstration plots. Landholders can see these plants and access their merits under near commercial conditions.

Horticulture

Research work continued on developing modern technology and improved varieties for Queensland's wide range of new and established horticultural crop industries. Information was communicated to producers through individual contacts, and through growers' meetings, field days and publications.

Tissue-culture research expanded to develop rapid propagation systems for horticultural crops and to breed new improved varieties. The banana germplasm bank at Maroochy Horticultural Research Station now contains 54 genotypes.

A tissue-culture propagation method was developed for papaw. This technique allows the industry to propagate selected plants, and, for the first time, offers the industry the opportunity to stabilise papaw varieties. Previously, cross pollination from male to female trees made the maintenance and commercial propagation of elite selections difficult.



Longans are one of a number of subtropical fruit that the DPI is assessing for their commercial and agronomic viability.



A research horticulturist measures the root temperature of a fruit tree in a controlled environment chamber at Maroochy Horticultural Research Station, Nambour.

A new hybrid mandarin variety had been developed and was in the final stages of field testing before its release. The variety, to be named Aurora, competes directly with Imperial, but has better external colour and bigger fruit, and is easier to harvest.

An early red apple variety GB155 that matures in early January, some 6 weeks before Delicious, was developed at Stanthorpe. Quality and flavour were distinctly superior to other early apple varieties. More than 500 trees of GB155 in commercial evaluation trials should crop this season. A number of other promising early apple-breeding lines were under semi-commercial evaluation.

Bunch thinning and trimming treatments were developed to advance the maturity of Muscat Hamburg grapes. Treated fruit had an increased sugar/acid ration and improved bunch shape and berry size, making it more attractive for marketing.

The growth regulator paclobutrazol (Cultar [R]) applied to mangos as a collar drench in mid-summer restricted excessive vegetative growth and ensured satisfactory fruit set in trees that had not experienced sufficient winter chilling and dormancy for effective natural flowering. This chemical shows promise in a number of tree crops for restricting tree size and enhancing cropping.

Nine rambutan varieties were identified as suitable for production in north Queensland, after 55 introduced varieties had been assessed. The recommended varieties are high yielding with good fruit quality. Growers obtained high prices for this crop, which an increasing number of consumers were receiving enthusiastically.

The French bean variety Labrador, which is patented in the United States and was imported under a special arrangement, was identified in trial work as having major potential for both the processing and fresh bean industries. The variety produces high yields of pods having excellent quality and colour. Extensive areas were grown for processing and the variety should be available to fresh bean growers later in the season.

The carrot variety CT 85001 was selected from more than 300 varieties evaluated at Gatton Research Station. It has outstanding processing quality and is free of the 'black ring' disorder that is a continuing problem threatening the viability of Queensland's processing carrot industry. The variety was being commercially tested. Additional varieties had been identified for slicing and for fresh market production.

Marketing of horticultural produce continued to improve in response to extension officers' initiatives. Papaw growers were provided with new marketing information obtained by assessing out-turns on the Brisbane and Sydney markets and by interviewing wholesale and retail buyers. This investigation indicated a strong need to reduce ripe-fruit rots by applying postharvest chemicals and other treatments.

Surveys of tomato out-turns on the Brisbane market identified the need for individual growers to improve quality and presentation. Bundaberg and Bowen growers acted on the findings, and further surveys were planned for other major markets.

The avocado industry received special extension help to cope with falling prices resulting from increasing production. Extension days were held to give growers information on the correct management for pest and disease control, improved weed control, irrigation scheduling for crop and canopy management and increased plant densities for new plantings. Two special field days were held to provide information on the new phosphorous acid trunk-injection technique to control root rot.

The nursery industry was given the latest information on potting mixes and the prevention of root rot, through a training programme that included two workshops held in conjunction with the Queensland Nursery Industry Association. Because of demand, both workshops were repeated. A team of specialist officers helped nurserymen in central and north Queensland by visiting 49 nurseries and holding meetings at five major centres. Four issues of the newsletter *Ornamentals Update* gave useful information to 500 subscribers in the State.

New vegetable varieties were demonstrated to growers at field days. These included french bean and sweet corn cultivars suited to the Lockyer Valley, Gympie, Bundaberg and Bowen areas; carrots suited to the Fassifern Valley; and brassica varieties suited to growing areas in south-east Queensland.

Hail netting covered more than 60 ha on 14 Granite Belt orchards and saved \$500,000 worth of fruit during the year. A field plot was established to demonstrate the netting system to producers and the technique was the subject of field days and discussion group meetings.

Regulations were promulgated to prevent the movement of the banana diseases, black leaf streak and black Sigatoka, from Cape York to commercial banana production areas. Similar measures were introduced to confine a new strain of panama disease that attacks cavendish bananas to a defined area in south-east Queensland. The new regulations were integrated with existing control measures for bunchy top, panama and leaf spot diseases.

Regulations under both the Banana Industry Protection Act and the Diseases in Plants Act were completely reviewed in consultation with industry, after Savage Report recommendations.

The programme to eradicate the serious disease citrus canker from Thursday Island continued. Plant pathologists and quarantine officers did a number of surveys. The disease has not been detected since February 1986.



A DPI senior plant pathologist transfers spores of the powdery mildew fungus from a diseased plant to leaf discs, in a test for resistance to fungicides.

Continued dry seasons resulted in water reserves in the underground aquifers of the Lockyer Valley and Bowen districts reaching critically low levels. Increased water-use efficiency was achieved on many properties through trickle irrigation. This helped to conserve the limited available water reserves.

A horticultural-crop forecasting system was developed to predict weekly supplies of 60 crops for up to 10 years ahead. The predictions, which are based on estimates by DPI horticultural staff, will be revised each year. The data, for the first time, give growers and advisers a solid base on which to make decisions about plantings and investments.

Extension staff helped producers improve their approach to the marketing of horticultural products. Market surveys identified specific problems in papaw and tomato marketing, and grower education was directed towards overcoming the problems.

The Bundaberg Research Station was officially opened. Horticulture research staff servicing the vegetable and fruit industries of the Burnett region are housed in a modern office/laboratory complex. Research trials will include vegetables, citrus, coffee and subtropical fruit crops.

The DPI's Kamerunga Horticultural Research Station (Cairns) open day was attended by more than 600 visitors. Displays and talks covered a wide range of technological areas. Special interest focused on new crops, including coffee and tropical fruits.

Quarantine publicity was emphasised. In addition to displays at agricultural field days, programmes to intensify quarantine awareness were undertaken in the Torres Strait. A quarantine course specifically for customs agents was also conducted.



Mrs Nilufar Khartoon, an International Atomic Energy Agency fellowship holder, takes moisture determinations on insect culture medium. Nilufar, who is employed by the Bangladesh Atomic Energy Commission in Dhaka, began a year's training fellowship in 1986 in the DPI entomology branch's stored products group. Her project centres on irradiation as a control measure for hide beetle, a major pest of dried fish in her country.

Entomology

Heliothis damage causes severe losses in many crops. The extent of infestation during a season depends on the number of the previous generation that survive the winter. In Darling Downs field studies, more than 75% of the pupae were found to survive the winter and produce adult moths in the spring. Overwintering as underdeveloped pupae in the soil was the main way the pest withstood adverse seasonal conditions.

Sorghum midge (*Contarinia sorghicola*) is the most damaging insect pest of grain sorghum in Queensland and annual losses often amount to \$3 or 4 million. Experiments have determined the potential for economic loss in flowering crops under various intensities of midge attack. Research showed that midge can cause significant economic damage in the pre-flowering stage of head development. Under the same levels of midge infestation, damage to pre-flowering heads is about half that inflicted on flowering heads. The information will help farmers make better decisions about the need to spray for sorghum midge control.

Tests at Kingaroy to assess soybean damage caused by podsucking bugs successfully determined the most injurious levels of infestation. Soybean plants within field cages were artificially infested, and information accumulated for different species of bugs and different stages of soybean pod development. In this way, the extent and duration of bug infestation were regulated as was the stage of pod development at which damage was initiated. Six different species of podsucking bugs were studied in isolation and the level of damage by each assessed individually. Green vegetable bug (*Nezara viridula*) had long been considered the most serious member of the podsucking bug group, but the results of these experiments suggested that another bug *Riptortus serripes* was at least as damaging. Furthermore, *Riptortus* inflicted most damage during the crucial pod fill stage of pod development.

Studies were conducted to choose a suitable species of minute wasp that would parasitise *Heliothis* eggs and kill them before they hatched. Surveys done as part of the investigations revealed that three different *Heliothis* egg parasites occurred in Queensland, but natural numbers were too low to prevent *Heliothis* larval populations from reaching damaging levels.

Two other species were being tested for their effectiveness as parasites of *Heliothis*. Tests included rate of growth, resistance to commonly used insecticides and ease of mass rearing.

Plant pathology

Bacterial leaf blight of rice, which caused serious losses in the industry in 1985-86, was again severe in individual bays in some Atherton Tableland crops. Resistance from overseas sources was incorporated in many of the cultivars in the local breeding programme. Three hundred of these cultivars were screened for resistance. Surveys showed that bacterial leaf blight had not spread to crops in the Burdekin district.

Wild sorghum was identified as an alternative host for downy mildew of maize, explaining the distribution of downy mildew outbreaks and indicating that the greatest threat to maize is in the drier production areas. For the first time, Atherton Tableland maize was attacked by boil smut, which previously had been confined to south-east Queensland.

Investigations of wheat diseases continued. Crown rot, a soil-borne disease, was severe on some farms, but, overall, was less important than in 1985. Stripe rust was not located in commercial crops, but research showed that the resistance present in cultivars such as Cook, Bass, Banks, Torres, Kite and Seneca was likely to stop future significant losses. However, a new strain of wheat leaf rust was identified and could cause problems in some popular cultivars. Wheat cultivars into which resistance to yellow spot had been transferred were evaluated and found to possess good protection against this disease. The first field-inoculation trial with mycorrhizae was conducted on the Darling Downs and showed that these fungi could benefit plant growth.

Common root rot of wheat caused losses of more than 30% in some susceptible varieties. Sources of resistance were identified and some Australian cultivars were partially resistant. Techniques for screening breeding material were developed and the effects of growing wheat and other crops on soil populations of the pathogen were identified.

Studies on stalk rot of sorghum provided, for the first time, direct evidence that pathogens were an essential part of the lodging syndrome. Research showed that, before stalk breakdown and collapse could occur, both fungal pathogens and physical stress must be present.

A wide range of wild and cultivated sunflower material, comprising more than 65 lines, was screened for resistance to sunflower rust and *Alternaria* blight. Sources of resistance to both diseases were identified and were being included in a breeding programme.

The incidence of *Phytophthora* root rot in chickpeas grown at the DPI's Hermitage Research Station, near Warwick, was reduced by combining seed dressing with the fungicide metalaxyl and foliar sprays of phosphorous acid.

A major field programme to identify resistance to the new Race 4 of *Fusarium* wilt of bananas was expanded. The Honduran diploid SH3362 and the cavendish clone Dwarf Parfitt were resistant. Somacloned variants of Taiwan cavendish were introduced through quarantine. Isolated plants from the Queensland breeding programme survived in heavily infested soil and appeared promising.

Lettuce mosaic virus was severe in the Lockyer Valley causing 30 to 40% losses in some crops. Individual cases of near 100% infection with lettuce big vein and lettuce necrotic yellows viruses were recorded. A serology test was developed to detect lettuce mosaic in lettuce seed and revealed infection in a limited number of seed lots at a level sufficient to infect nearby crops and later plantings.

A combination of the fungicides benomyl heated to 52°C and prochloraz proved to be the most effective post-harvest treatment for stem end rot, which threatened to limit the export of mangos under controlled atmospheres. Grey mould and *Alternaria* rot were identified as significant causes of wastage in tomatoes held in controlled atmospheres. The fungicide guazatine gave good control.

After outbreaks of the soil-borne diseases of peanuts *Cylindrocladium* black rot (CBR) and *Sclerotinia* during recent years, a comprehensive research programme was initiated in north Queensland. A field trial, testing fungicides for *Sclerotinia*, showed potential for chemical control. Trials for CBR centred on the use of resistant varieties and soil fumigation.

Botany

The HERBRECS herbarium label data base, the second largest in the world, was playing an important role in the State's conservation activities. The system was being used by other Government departments, including the Department of Forestry and the Queensland National Parks and Wildlife Service, for conservation planning. It also played a central role in a conservation status review of Queensland vascular plants published during the year.

Field work was carried out in western districts for a field guide to be published on plants poisonous to stock in Queensland. All plants are being illustrated with colour photographs.

Botanists identified 11 650 plant specimens for primary producers, officers of State and Commonwealth bodies, and the general public. Many of these plants had been introduced for evaluation as pasture species. Advice was also given on the relationships of legumes introduced as possible pasture plants.

A senior DPI officer was appointed Australian Botanical Liaison Officer at Kew Gardens, England, for a year to provide a botanical service for Australian research workers and overseas botanists interested in Australian flora.

Preparation of the third volume of the *Flora of South-Eastern Queensland* continued. A major part is an account of grasses and sedges. As a preliminary to the volume, a guide to identifying Queensland sedges and rushes was published.

Plant taxonomists described two new genera and 21 new species of plants from Queensland and provided seven new names for Queensland plants. Discovery of the two new genera was the result of collections in Cape York Peninsula.



Eucalyptus argophloia—an attractive tree, widely planted in south-eastern Queensland, but restricted in the wild to a few small stands near Chinchilla.

Land management highlights

Erosion incidence

Soil erosion incidence throughout the State was low due to the dry seasonal conditions and the relatively low intensity of the rain that did fall. Only isolated occurrences of severe soil erosion were recorded. This was the third successive year of low to moderate soil erosion.

The failure of both summer and winter grain crops throughout the State meant that the level of protective cover, from either growing crop or stubble, was low. On many properties, stubble had been either baled or grazed. In addition, most of the State's grazing lands had poor grass cover owing to the prevailing dry conditions. Because the protective cover was low, much of the cropping and grazing land was vulnerable to soil erosion should heavy rainfall occur.

Adoption measures

Soil-conservation officers designed and surveyed soil-conservation measures (contour banks, waterways and strip cropping layouts) on 53 000 ha of cropping land. More than 1.1m ha of cropping land have now been protected with soil-conservation measures throughout Queensland, and, in areas such as Kingaroy-Murgon, Monto and Theodore, more than 80% of the land needing contour banks has been protected. Graziers increased their demand for advice on soil-erosion control measures and practices in grazing lands.

Landholder interest in conservation cropping continued to develop. The trend towards tined implements increased greatly in the last four years in the extensive croplands, with many farmers using fewer cultivations during the fallow period. Retention of trash in canegrowing districts increased significantly, with 45% of Cairns and Ingham canefarmers harvesting unburnt cane and retaining the trash; 75% of Mackay and 50% of South Johnstone growers retaining burnt trash after harvest; and 40% of Maryborough and Childers growers experimenting with reduced tillage and trash retention.

Farm plans are prepared for all farmers who request soil conservation works. Land-management recommendations are provided with all farm plans. A total of 380 farm plans, for a total of 173 000 ha, were prepared for landholders.

Soil-conservation measures were implemented for the first time by 220 landholders. More than 12 000 farmers had implemented soil-conservation contour measures on cropping land.

Extension

Conservation-cropping demonstration farmer plots had been established in about 40 locations in the grain and sugar areas. The demonstration plots, together with key farmer cooperators, are used to develop new conservation-cropping management techniques. Farm walks and field days to demonstrate these management techniques were well attended.

A colour booklet, *Guidelines for Property Development in the Central Highlands*, was produced to guide landholders undertaking property development.

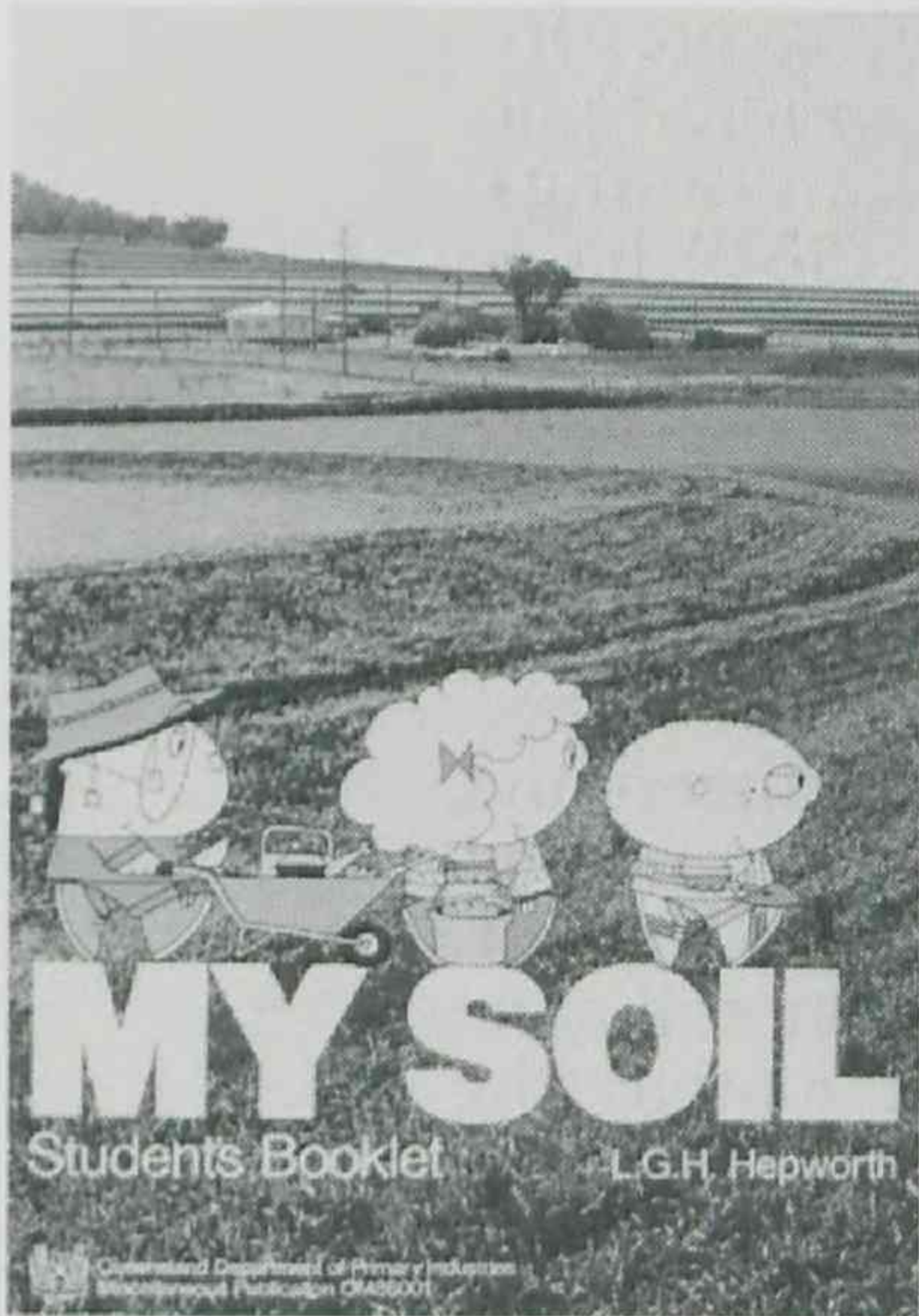
Soil-conservation officers use the individual farm visit as the most important extension activity for convincing farmers of the need for run-off control works. Landholders were being increasingly involved in developing individual farm plans and catchment schemes. Even under the harsh climatic and economic conditions, landholders responded well to this approach. More than 80% of landholders in the central Queensland catchment schemes—Oombabeer, Kilcummin and Gordon Downs—were undertaking soil conservation work.

Gullies in grazing land can be controlled relatively cheaply with gully-control structures. This corrugated-iron 'verandah flume' stops further erosion of the gully head. Water flowing over the flume falls to the gully floor without coming into contact with the unstable gully head.



In the Mackay area, whole farm plans were used to demonstrate layouts and overcome farm workability concerns. As a result, interest in soil conservation and rates of implementation of structures rose.

A mass media campaign was used in the Central Highlands to encourage farmers to maintain structural works. In south Queensland, a media campaign and farm walks at demonstration waterways were used to encourage farmers to stabilise waterways. The slogan, 'Planting waterways is easy', was used.



Community involvement

Local community groups continued to make a big contribution to soil conservation, and soil conservation officers worked closely with these groups. The Inglewood Land Management Committee developed management guidelines for the grazing lands in the shire and the Lockyer Watershed Management Committee continued to develop and demonstrate management practices.

The six advisory group committees set up with declared areas of soil erosion hazard on the Darling Downs and Coastal Burnett were disbanded after *Soil Conservation Act* 1965-80 was repealed. They were to be replaced by district advisory committees, and nine such committees had been proposed.

A colour booklet, *My Soil*, was launched by the Minister, Mr Harper. Copies were distributed to all Queensland primary schools. The booklet treats the subject of soil erosion and soil conservation in a way that entices schoolchildren to learn. The demand from teachers and students for soil conservation information increased.

Technical advancements

Most farmers recognise the advantages of conservation-cropping techniques, but, for many, suitable commercial machinery is either not available or too expensive. A low-cost reduced-tillage planter was constructed to demonstrate reduced- and zero-tillage planting techniques for grain crops in southern inland Queensland. At Mackay, a conventional cane planter was modified to plant into undisturbed soil. The dry seasonal conditions highlighted the benefits of reduced and zero tillage in many districts.

African star grass has now been shown to be an excellent waterway grass in southern inland Queensland, outperforming all other grasses on heavy soils. As the grass must be planted from sod, a range of planting techniques have been developed for farmers to use.

Relatively cheap gully-control structures installed in many districts were showing great promise.

New Soil Conservation Act

The Soil Conservation Bill was introduced during the 1986 Autumn Session of Parliament and was allowed to lie on the table to enable thorough rural industry and community discussion. Owing to the proroguing of Parliament, the Bill was reintroduced and passed in the 1986 Budget Session. It received Royal assent on 5 September and replaced the 1965 Act. The new Act is based on the principle that soil conservation is primarily the landowner's responsibility. The Government's role is to provide technical advice, education, leadership, financial assistance and legislative support to achieve coordination of soil conservation measures between affected parties. The Act provides for the approval of property plans for individual properties, and of project plans for groups of properties.

The Minister for Primary Industries, Mr Harper, appointed a Soil Conservation Advisory Committee, consisting of primary producer and local government representatives, to advise him on the Act's implementation.

Land resources

Land-evaluation studies in the sugar-cane districts continued, with all projects nearing completion.

In the Ingham area (the Herbert River Lowlands), soil mapping and land-suitability assessment for the major crops had been completed. Preliminary results indicated about 95 000 ha were suitable for arable agriculture, with 42 000 ha of this presently under sugar-cane.

The Cardwell-Innisfail land-use study covers 242 000 ha in two separate surveys. The CSIRO had previously mapped soils of the section north of Tully (137 000 ha). Soil-suitability assessments had been completed for 80% of this section. The section south of Tully (115 000 ha) is noted for sugar-cane, bananas and beef production from tropical pastures. The soils report and land-suitability map, in preparation, indicated about 30 000 ha suitable for arable agriculture. About a quarter of this was being used for that purpose.



Stubble-mulching machinery, such as this blade plough, is used to cultivate the soil, with minimum disturbance. Plant residues are retained on the surface to protect the soil from erosion during heavy rain and to increase rainfall infiltration into the soil.

The Plane Creek study soils, land-use and land-suitability maps were prepared for printing.

The high-intensity soil survey (1:25 000) of the Burdekin River Irrigation Area continued. This programme will provide detailed soils information suitable for designing overall irrigation layouts and farm subdivisions and for planning land use. Mapping of the Northcote section totalled 2990 ha of a total area of 8920 ha. The report for the Mulgrave section (8460 ha) had been drafted and maps were being prepared.

The report for the Leichhardt Downs section (9711 ha) was printed and distributed. The report indicates 8134 ha are suitable to some form of irrigated use. Of this potential irrigation area, 7700 ha are suitable for sugar-cane, 5644 ha for grain crops, 2764 ha for small crops, 2974 ha for mangos and 3350 ha for rice. A total of 2511 ha are suited to sugar-cane, grain crops and rice. Field work was almost completed for the Leichhardt Downs Relift section (1940 ha). A reconnaissance survey was completed for the Haughton section and an area selected for high-intensity survey.

High-intensity soil surveys provided soil data for developing and planning research activities on eight DPI research stations.

The medium-intensity soil survey (1:50 000) of the Lockyer Valley alluvia continued, with some 39 000 ha of the 61 000 ha survey area now mapped.

Low-intensity surveys (1:100 000) provide information and guidelines on areas suitable for development or more intensive use. The South Burnett soil survey (180 000 ha) was planned and the Emerald soil survey (250 000 ha) initiated. The National Soil Conservation Program provided funds for three land-assessments projects. About 30 000 ha, covering 53 soil types, were mapped in the Roma area and 150 000 ha, covering 35 soil types, in the Kilcummin area of central Queensland. In the Atherton-Einasleigh region of north Queensland about 40 000 ha had been mapped.

The reconnaissance survey (1:250 000) of the Central Burnett region was completed. A report was being prepared and maps had been prepared for printing.

Evaluation and planning

Evaluation and planning for potential irrigation developments and shire planning continued.

The irrigation potential of land adjacent to the Warrego River near Charleville and Keane's Crossing near Cunnamulla was assessed. Preliminary results indicated adequate suitable cropping land occurs at the Cunnamulla site, while the Charleville site is more suited to horticultural crops. About 40 000 ha downstream of proposed dams on the Millstream and Blunder Creeks near Ravenshoe were evaluated for their irrigation potential. This study is part of a QWRC-commissioned feasibility study of the Tully-Millstream hydroelectricity proposal.

A regional assessment of the Dawson River basin, in a QWRC-commissioned study, revealed extensive areas with potential for irrigation.

Local authorities continued to request land-resource data to help in shire planning. Projects for Moreton and Gatton shires were completed to help them prepare their strategic plans. Advice on town planning schemes, rezoning and subdivision proposals was given to 31 shire councils. A collaborative study was coordinated between the three Sunshine Coast shire councils, the sugar industry and the BSES to provide information for planning policies for the Moreton Mill cane-growing area.

A land suitability study of potential tea-growing areas on the wet tropical coast revealed that the main concentration of suitable land was on the coastal strip from Tully to Innisfail and on the eastern Atherton Tablelands.

Land-management field-manuals for districts provide resource bases for farm planning, run-off control structures and conservation-management systems. The Roma manual was published and manuals for nine other districts were in preparation.

Salinity investigations continued to be a high priority. Salinity-hazard assessment of vacant Crown lands near Maryborough indicated the land was unsuitable for irrigated cropping. A joint project with the BSES investigated the irrigation suitability and salinity hazard over 14 500 ha of canelands in the Isis Mill area near Childers. The QWRC will use the information in designing irrigation distribution and in recommending irrigation practices.

Monitoring of rangeland condition, soil loss and run-off in the mulga lands of south-west Queensland was funded by the National Soil Conservation Program. Preliminary results confirmed some landscapes had been eroded and productivity affected. A joint study with the Lands Department in the Paroo region of south-west Queensland indicated a serious woody-weed problem existed over extensive areas. Sound management practices can maintain the productivity of unaffected areas.

Computer handling of resource survey information was improved by further development of the WARIS storage, manipulation and retrieval package.

The CAD (computer-assisted drafting) workstation was commissioned to prepare maps for printing and to provide data manipulation facilities for thematic maps. The system had been successfully trialled and greater efficiencies in mapping procedures and output achieved.



A cartographer uses a Wild TA10 flat-bed plotter for scribing thematic data in producing a soils map. The plotter is part of the recently installed computer-assisted drafting workstation installed in the DPI's land resources branch, Indooroopilly.



A very good sorghum crop established under reduced tillage practice at Mt Murchison, near Biloela, central Queensland.

Soil conservation research

Tillage trials at Biloela in central Queensland showed that, in most years, blade and zero tillage with stubble retention resulted in soil-water storage and grain-sorghum yields as good as, or better than, those from conventional disc/tyne tillage. Blade and zero tillage also gave greater surface cover, providing increased protection against soil erosion. On the cracking clay site, organic carbon, total nitrogen and bicarbonate extractable phosphorus levels in the surface soil (0 to 10 cm) declined in all tillage treatments over the trial's 7-year period. The decline in total nitrogen was significantly lower in zero tillage with stubble retention than in other treatments, indicating that, in the longer term, zero tillage has potential for reducing the soil-fertility decline in cropping lands.

At Goondiwindi, a tillage trial on a sodic, texture-contrast soil showed that zero tillage with stubble retention during the summer fallow stored the most soil water but the least plant-available nitrogen. As a result, zero till with stubble produced the highest wheat yield in a dry growing season but the lowest in a wet season. However, in wet years fertiliser application can overcome nitrogen deficiency.

A study of the effects of pasture condition, climate and geomorphology on run-off and soil erosion in the Nogoia catchment grazing lands began after concerns about land degradation and associated sedimentation in the Fairbairn Dam. Some erosion was found to be due to geomorphic processes unrelated to land management. Sufficient sediment was found already in the streams to maintain the current sediment delivery to the dam for at least 10 years. Soil erosion on hillslopes was reduced when pasture cover was greater than 40% (about 2000 kg dry matter/ha). Burning of pasture increased run-off rate. The information from the study was being used to develop management guidelines for reducing grazing-land erosion.

Cropping strategies, including ley farming practices, were being investigated to enable stable crop production to proceed in the traditional grazing lands of north Queensland semi-arid tropics. The study, near Mt Garnet, indicated that zero tillage and other conservation tillage practices could successfully grow peanuts, sorghum and maize in this environment. Early results suggest the value of zero-tillage in reducing run-off and erosion.

Basaltic clays on the Nogoia River's left bank are an important production unit of the Emerald Irrigation Area. A joint study with the QWRC was initiated to quantify soil erosion resulting from both rainfall and irrigation and to relate the degree of erosion with furrow length. On this black-earth soil with 1% slope, soil losses for the season varied from 4 to 6 t/ha. Storm rain caused most soil loss, and this loss increased as furrow length increased.

A large hydro-salinity experiment was established on permeable red upland soils on the right bank of the Burdekin River Irrigation Area. This 50 ha site was designed to study the effects of furrow irrigation on the depth of the water table and on water logging and salinity down slope. Early results suggest that the water table depth had been affected despite a very dry wet-season.

Agricultural chemistry

A soil-solution extraction apparatus was devised and constructed so that fertiliser effects on the soil-solution composition of Queensland's problem acidic soils could be researched.

A soil boron analysis method, based on extraction with a hot, weak salt solution, was glasshouse tested on a range of Queensland soils. It was found to be a suitable diagnostic test to identify boron deficiency in soils.

Soil fertility changes were measured when native brigalow scrub in central Queensland was cleared and burned and the land used for pasture production or cropping. Soil organic matter and total nitrogen levels declined after clearing and burning, while levels of nitrogen, phosphorus and potassium, in forms suitable for plant uptake, increased. The increases in nitrogen levels were short-lived, but soil phosphorus and potassium levels remained relatively high after 3 years of cropping or pasture production.

A rapid field test for nitrate in plant sap was developed for diagnosing cotton and tomato nitrogen status. It was designed for growers to monitor plant nutrient status so that they could make rapid re-adjustment to fertigation schedules. The procedure also proved useful in testing for high nitrate concentrations in ryegrass and beetroot.

A sunflower breeding line with oil high in linoleic acid (that is, polyunsaturated) was developed, using a micro-analysis technique devised by DPI chemists. Over the next 3 years, this material will be selectively bred and back-crossed to produce linoleic acid hybrid lines for commercial release.

Insect control in cotton, a high-cost problem, was being addressed. The age, sex and host plant origins of major cotton pests were being investigated using chemical techniques. Such data would greatly help control the pests by providing an understanding of their population dynamics.

Training of two residue chemists from the People's Republic of China was undertaken in Queensland as part of a joint project. Two chemists from DPI's agricultural chemistry branch spent several months in Beijing training staff there.



Tillage practices to minimise soil erosion in central Queensland are accompanied by studies of changes in soil fertility. Here staff from the DPI's Biloela Research Station are using a DPI constructed rig to sample soil profiles in sorghum plots.

Fisheries highlights

Prawn fisheries

Sampling of commercial prawn species in Torres Strait, using the DPI's research vessel *Lumaigul*, yielded valuable information on their biology, abundance and movements, of direct use to fishery management. Data were collected from recaptured brown tiger prawns, 20 000 of which were tagged and released in early 1987.

An assessment of the red-spot king-prawn resource off central Queensland was completed. A tagging programme yielded information on growth, migration and mortality, while stock distribution and density estimates were derived from monthly survey catches. Commercial trawler operators supplied valuable catch and effort figures through a voluntary logbook scheme. Synthesis of all the available information indicated that the red-spot king-prawn stock was healthy and not over-fished.

Seagrasses

Important seagrass habitats, used as 'nursery' areas by commercially valuable prawns and fishes, were extensively surveyed along the Queensland coast. It was found that most seagrass species are limited to water depths of 10 m or less and that the greatest biomass occurred in 2 to 6 m. The Queensland Fish Management Authority and the industry were advised that trawling should be limited to waters deeper than 10 m to protect 'nursery' habitat and juvenile prawns. Mapping of seagrass beds in Pumicestone Passage also began, with high community involvement from environmental groups such as the Estuarine Research Group and the Caloundra State High School.

Gear technology

Prawn escape behaviour continued to be observed using the experimental tow-tank at the DPI's Northern Fisheries Research Centre, Cairns. During trials, 60% of prawns escaped capture, with most going over rather than under the net opening. Prawns injured by fishing gear, but not caught, are a loss to the industry.

Field studies on prawn trawling nets, employing camera-equipped divers in a minisubmarine, highlighted the problems of poor net design. Enthusiastic attendance of video reviews by fishermen indicated further cooperation in fishing-gear development.

Exploratory fishing

A survey by the DPI's research trawler *Gwendoline May* of new fishery resources among the Swains and Hardline reefs off Rockhampton identified large areas of trawlable bottom, some supporting commercial quantities of prawns, scallops and bugs. Detailed charts and survey results were made available to fishermen and also to the Great Barrier Reef Marine Park Authority for developing zoning plans.



DPI fisheries research staff sort the catch aboard the DPI's research trawler *Bar-ea-Mul* during trials to determine whether a new type of net made from a single strand of nylon catches more prawns and trash fish than the traditional net made from multistrand polyethylene cord. The traditional nets were more efficient than the monofilament type.

Coastal wetlands

Historical changes to the coastal fringe of southern Queensland were quantified by planimetric analysis of aerial photographs and charts. The analysis gauged the impact of foreshore modification on fisheries production.

Barramundi breeding

Barramundi can now be induced to spawn any time during the natural breeding season, opening the way for large-scale production using hatchery broodstock fish. Further work to extend the breeding period was underway. Short-term sperm storage is now possible using cryopreservation methods.

Twenty thousand fingerlings were stocked into Lake Morris in north Queensland, complementing the successful stocking of Lake Tinaroo last year. The Lake Morris fish showed good survival and growth, confirming the suitability of barramundi as a species for developing put-and-take fisheries in lakes.

Trials involving the rearing of barramundi on formulated pellet diets showed fish reared in freshwater at about 25°C reached a mean weight of 560 g. These are suitable for marketing as plate-sized fish, at one year from spawning. Excellent food-conversion ratios were obtained. Taste-panel evaluation indicated that the pellet-fed fish were of good marketable quality. The results showed encouraging prospects for commercial farming of barramundi.

Aquaculture

Construction work continued on the DPI's Bribie Island aquaculture centre, with the erection of hatchery buildings and completion of design work on the seawater intake. The facility was expected to be operational in late 1988.

Research on the temperature tolerance of the giant freshwater prawn (*Macrobrachium rosenbergii*) showed that good growth rates can be achieved in the hottest parts of the State. Initial studies on the northern freshwater crayfish (*Cherax quadricarinatus*) indicated that it has good potential for aquaculture, especially in the tropics.

Gillnet fisheries

After intensive barramundi study in recent years, the focus for gillnet fishery research was on threadfin salmon or tasselfish, which are second in importance only to barramundi. Laboratory and field studies on the age, growth and movement of this species began.

Tuna

Fishing trials off south Queensland proved the existence of a seasonal fishery for sashimi-grade tuna. Three successful trips between July and September yielded 59 yellowfin tuna that grossed about \$30,000 on the auction floor in Japan.

Ciguatera

Antibodies to ciguatoxin may be useful in detecting ciguatoxic fish. A novel immunisation procedure was used to produce the antibodies, but more purified toxin was needed to refine the method. Clinical trials of a promising treatment for ciguatera began in a collaborative programme involving University of Queensland researchers. If successful, this would be a major breakthrough, because no recognised medical treatment for ciguatera poisoning exists.

Bait worm collection

Bait-worm collecting is a million-dollar industry in south Queensland. Major collection areas are Moreton Bay, where worms are dug with forks from intertidal seagrass beds, and Fraser Island, where beach worms are caught by hand. Management plans were being developed with the industry to minimise the impact on habitat, to avoid undue pressure on worm stocks and to protect recreational fishery interests.

Marine aquarium fish

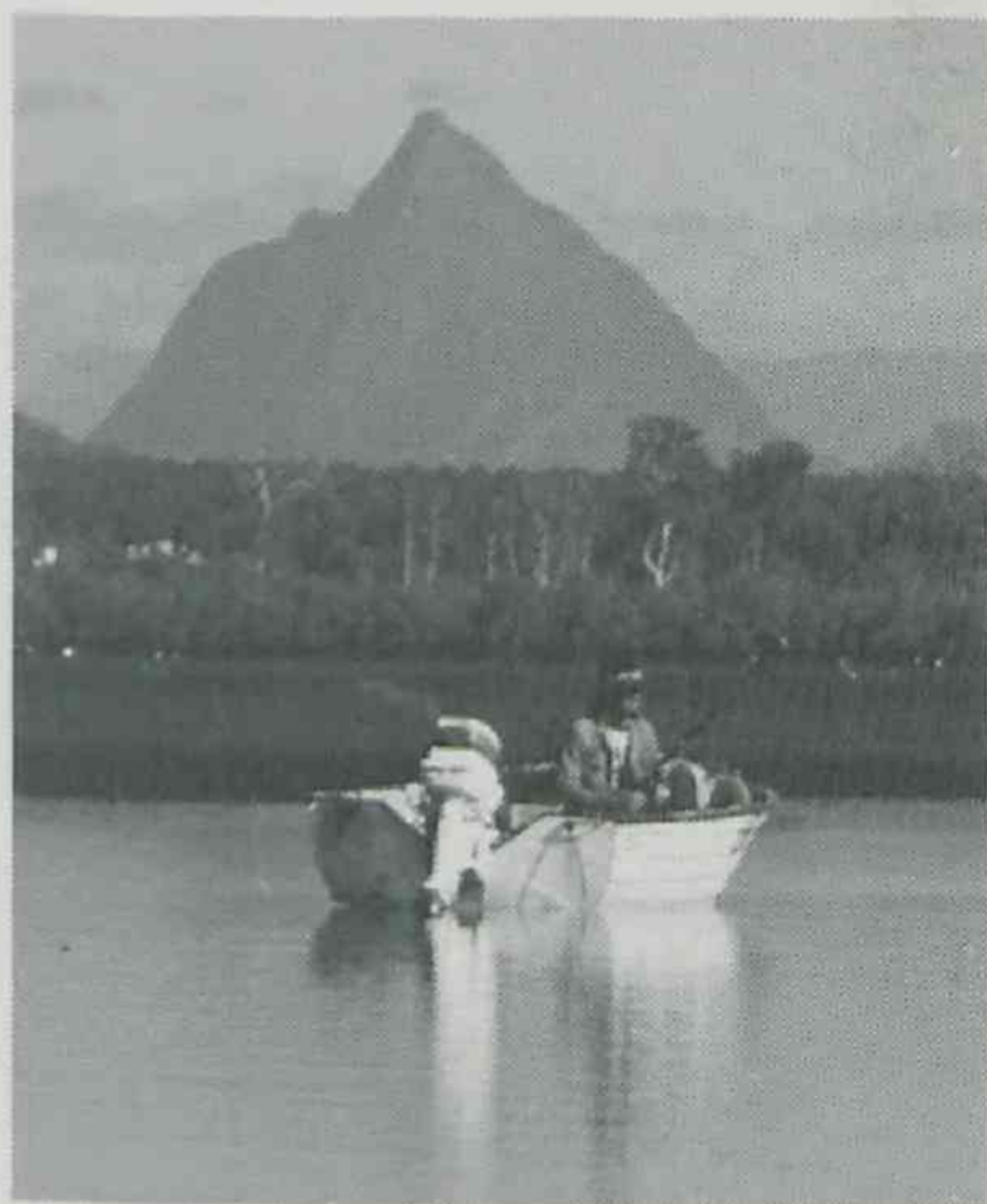
This small industry is growing rapidly to meet increased local, interstate and overseas demand for aquarium fish species. A management plan was developed in conjunction with industry operators for 1986-87. Some 68 people were issued with permits to collect marine aquarium fish while 40 new applications were received.



DPI fisheries laboratory technicians evaluate a test for detecting ciguatera poison in fish flesh. This work is part of an overall project that the DPI is undertaking to solve the problem of ciguatera poisoning.



DPI fisheries officers conducting a 'boat ramp' survey of recreational fishermen in Hervey Bay to assess angling trends. This survey is a cooperative study involving local service clubs, fishing clubs, high school marine studies students and DPI fisheries officers. The study results from community concern about managing fishery resources in Hervey Bay.



Tripcony Bight, Pumicestone Passage (Bribie Island), which has been a declared State marine park since 30 January 1986. The park limits foreshore development, provides protection for its wetlands and supports recreational activities such as boating, fishing and birdwatching. The Glasshouse Mountains are a distinctive backdrop.

Corals and trochus

Industry meetings to review coral-collection management strategies were held in Mackay and Cairns. Major concerns included market competition from imported coral products and possible restrictions on future collecting activities.

New management guidelines for the trochus fishery were developed in January. These specify collecting area and size-range of product, and impose quota restrictions.

Fish stocking program

More than 700 000 fingerlings of silver, golden perch and murray cod were stocked in 10 dams and 4 weirs in south Queensland in 1987. Dams from the Queensland border, west to Mitchell and north to Gladstone, were stocked. Local communities were involved in developing the programme and 11 management committees were formed. Membership includes anglers, service club members and local authority officers. DPI officers acted as coordinators for each dam and weir to supervise the stockings. The QWRC appointed liaison officers for each of its impoundments involved in the programme. The local management groups took part in pre-stocking surveys, the transport of fingerlings and the introduction of fingerlings into the water. Education and surveillance programmes were in place. Community cooperation was the project's highlight.

Tailor tagging

Because tailor catches had declined, the DPI and the Queensland Sport and Recreational Fishing Council began a 3-year research programme. More than 2000 juvenile tailor were tagged. Recapture data indicated that juvenile tailor were highly mobile and subjected to high fishing pressure.

Hervey bay fishing survey

Recreational fishing is an integral part of coastal lifestyle. After a reported decline in fish catches in the Wide Bay region, the DPI began studies of factors that affect fisheries in this area.

Creel surveys were conducted at boat ramps and beaches. Local residents and high school students helped conduct the surveys, and data were obtained from 1100 recreational fishermen. The DPI interviewed 50 commercial fishermen to obtain their catch information.

A land-use study of the Burrum River Estuary catchment identified land-use changes over a 14-year period, such as a 78% increase in cultivation and a 23% reduction in undisturbed land.

Environmental protection

The DPI assessed 27 environmental impact studies and examined a further 48 projects that could adversely affect fish habitat areas. Alternative concepts were discussed with developers to minimise loss of fish habitat.

Six new fish habitat and wetland reserves were gazetted in the Sarina to St Lawrence region. Studies on proposed reserves continued in the Gulf of Carpentaria, Trinity Bay and Inlet (Cairns) and Bowling Green Bay (Townsville).

Fuel efficiency in trawl fishing

Queensland has more than 1200 trawl fishing vessels, and fuel costs are their biggest single cost outlay. A project, with Commonwealth Department of Resources and Energy support, was investigating ways to improve efficiency in fuel use. Electronic recording instruments were designed so that engine performance, fuel consumption, vessel speed and trawling loads could be monitored continuously. This equipment will enable fishermen to adjust their trawl gear for even more efficient operation. By 30 June, four sets of equipment had been installed on commercial fishing vessels. Monitoring on the DPI's research vessel *Bar-ee-Mul* showed how power efficiency falls away either side of critical engine and boat speed combinations.

Canals fish study

The DPI surveyed the fish of tidal residential canals. Canals differ substantially from undisturbed estuarine areas in sedimentary composition, water quality, fish abundance and species. Most canals support important juvenile fishes such as whiting, bream and mullet. Good salt-water access maximises the use of canals for breeding habitat.

Food research highlights



Eggs being tested as part of a DPI food research project to assess the efficiency of detergents used by industry in egg washing.



A laboratory technician adds sauce to a batch of navy beans being tested for use as baked beans, at the DPI's food research laboratories, Brisbane.

Food research and technology

The newly formed food research branch was further reorganised with the incorporation of part of the disbanded dairy field services branch. The renamed food research and technology branch now includes the resources to provide a more comprehensive extension service to the food-processing industries. It also carries the regulatory responsibility for the dairy processing industry. The research capabilities to service dairy, seafood, meat, and fruit and vegetable processing were maintained.

Dairy

Studies were carried out on the diagnostic use of the milk enzyme NAGase for detecting bovine mastitis. A rapid chromatographic procedure for analysing NAGase was developed to provide a more detailed diagnosis of the disease. The test, based on the separation of isoenzyme forms, indicated the extent of udder-tissue damage, leucocyte infiltration and serum leakage in the infected quarter.

Pregnancy diagnosis in dairy goats was checked with commercial kits that detect the hormone progesterone in milk. Results indicated that the kits were highly accurate in correctly diagnosing pregnancy or non-pregnancy using a milk sample taken 21 days after mating. Cooperating farmers found the kits easy to use and the results easy to interpret.

Certain components of the milk-fat globule membrane from cow's milk inhibited the action of enterotoxins produced by *Vibrio cholerae* and *Escherichia coli* organisms. Purified preparations of these components could be produced commercially from buttermilk and tested for their effectiveness as pharmaceuticals for human or animal use or as infant food supplements and additives.

Extracts of bovine neutrophils, white blood cells that can be obtained from cattle blood or from milk separator slime, were potently bactericidal towards mastitis pathogens. The agents responsible for this antimicrobial action are small proteins or peptides. Isolation and purification of these compounds could provide natural pharmaceuticals for treating mastitis.

Accelerated ripening of cheddar cheese reduces manufacturers' production costs. Accelerated-ripening technology had been developed along two avenues: storage temperature control and the use of mutant starter cultures. After successful factory trials in Queensland, elevated-temperature ripening was successfully demonstrated in cooperation with NSW and Victorian manufacturers. Economic evaluation of the mutant starter technology shows it may have potential for use in producing vintage cheddar cheese.

Monoclonal antibodies to the flagella of the milk spoilage micro-organism *Pseudomonas fluorescens* were produced. These antibodies are used in sensitive immunological tests being developed to detect the presence of all known strains of this bacteria in dairy products.

Seafood

Longline fishing trials, in cooperation with commercial fishermen, caught several tonnes of yellowfin tuna off southern Queensland. Prices obtained for the fish in Japan varied from \$2 to \$40/kg. Longline gear appropriate for use on prawn trawlers was developed. This work has been important in setting up the tuna fishery in southern Queensland.

Soaking scallops in water to increase their weight is a practice criticised by export markets. In conjunction with Commonwealth DPI officers, the QDPI developed tests to detect soaked scallops. A 'pressure test' developed in Victoria was found to be unsuitable.

Investigation of mushiness in sandcrabs showed the defect to be due to protein breakdown by the crab's hepatopancreas enzymes. Optimum cooking, storing and handling conditions to minimise the defect's incidence were determined.

Red-spot king prawns and coral prawns were collected during sampling trips in reef waters between Lucinda and Bowen. The red spots had better keeping quality on ice (12 days compared with 9 days) than coral prawns, although the appearance of the coral prawns was unacceptable after 2 to 3 days. The coral prawns had excellent flavour when fresh.

Fruit and vegetable research

Evaluation of the suitability of new cultivars of vegetables for canning and freezing continued, in cooperation with the DPI's horticulture and agriculture branches and with processing companies. Several new cultivars were considered to have potential for commercial use, particularly the carrot cultivar CT85001, which had excellent colour and flavour and reduced occurrence of green-top and black-ring.

The new Spanish-type peanut cultivar H54, bred by the DPI at Kingaroy, was found to be superior in quality to the commercial cultivars, Red Spanish and White

Spanish. Trials were carried out with both raw and roasted nuts, before and after storage.

Microvinification techniques were used to produce varietal white wines of outstanding quality from vines growing at Applethorpe. This success followed 3 years of assessing grape varieties.

Meat

A trained meat taste panel was being used to assess the effects of common industrial and household meat-handling practices on meat palatability. This work was being carried out to assess the combined effects of electrical stimulation, tender stretching, ageing period, freezing rate and thawing method on the quality of steaks prepared under normal household cooking conditions. The results will be used to advise industry and consumers on the best ways to handle meat for maximum palatability and consistent quality.

Sensory assessments of meat from chickens and pigs fed on grain contaminated with various levels of weed seed showed that the weed did not cause significant tainting of the meat at the levels studied. Weeds are common contaminants of cereal grains and can taint animal products. The level of contamination that can be tolerated needs to be known.

Quality services

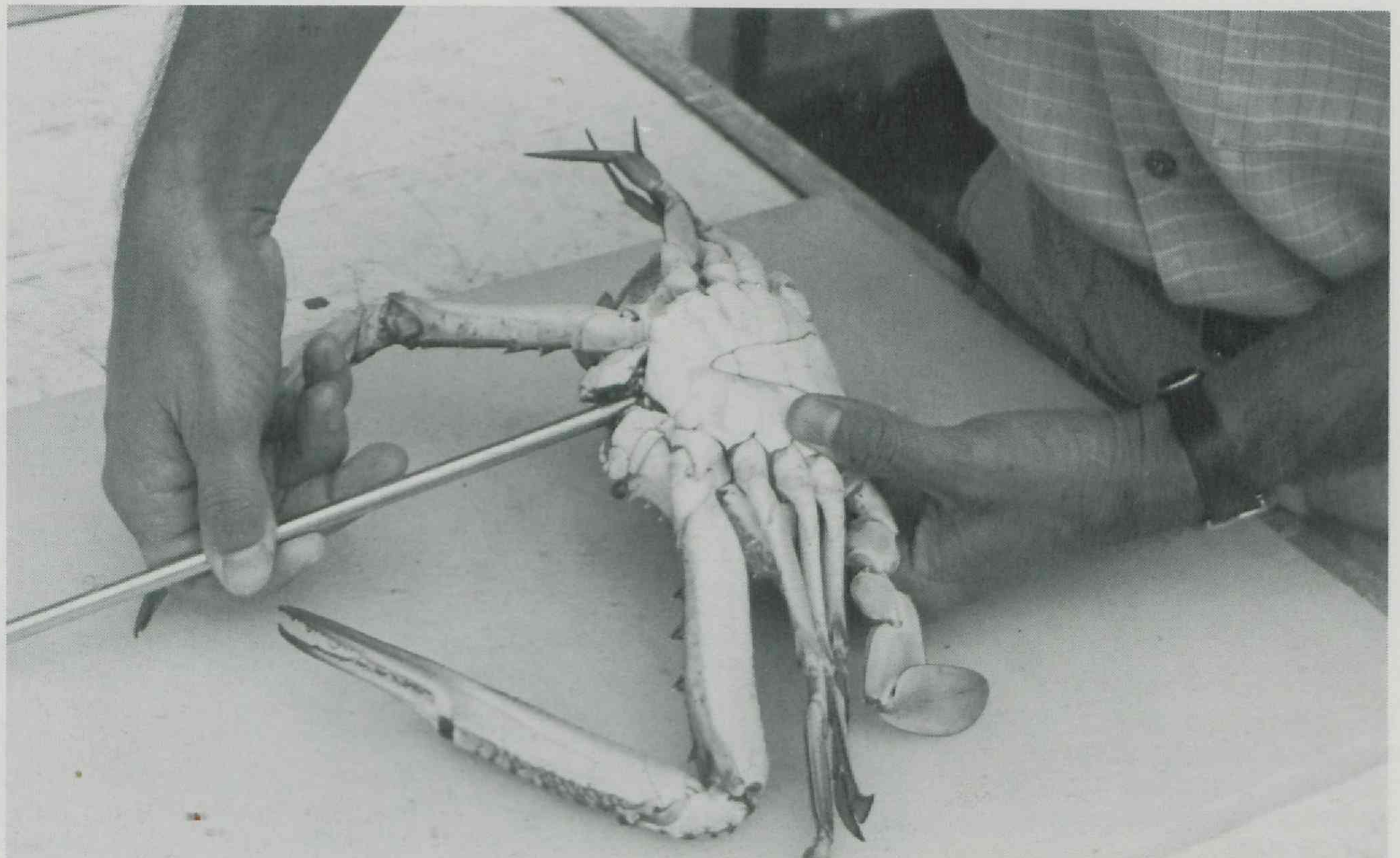
In July 1986, responsibility for State-wide monitoring of liquid-milk quality was transferred from the DPI to the dairy factories. Factory laboratory results are sent to the DPI's food research and technology branch for computerised collation before distribution to field staff and statutory authority personnel. An interlaboratory testing programme was set up for the factory laboratories to help maintain consistency in testing throughout the State.

Extension services

In February, the first issue of a newsletter called *Food News* was distributed to Queensland food processors and to educational and marketing organisations. The DPI's food research and technology branch is producing six issues of the newsletter each year, to keep food industries informed on the latest research, technology and developments from both DPI and other sources.

A shop-sampling programme for surveillance of retail dairy product quality was extended to remoter areas. Personal contact with shop managers had helped make them more aware of what is involved in proper dairy product handling.

A programme to check the condition of milk pasteurisers using a pressure test had covered all regions and had demonstrated the need for all plate heat exchangers to be tested regularly. Extension of the programme to other industries, such as the wine industry, was being considered.



Spiking of sand crabs: a handling method that artificially induces mushiness in the flesh. DPI food scientists are investigating ways to overcome the incidence of this crab-meat defect.

Marketing and economics highlights

Grain handling Royal Commission

In late 1986, the Commonwealth and the five mainland States formalised the proposed Royal Commission into Grain Storage, Handling and Transport. The Commission was granted broad powers to inquire and report on the nature of the most efficient and cost-effective system for providing storage, handling, transport and port terminal services for grain-marketing authorities and organisations and for grain growers in Australia.

The DPI's division of marketing coordinated the Queensland Government submission that was prepared in conjunction with Queensland Railways, the Departments of Transport, Harbours and Marine, and Main Roads, and the Port of Brisbane Authority. The submission was presented to the Royal Commission's public hearing in Brisbane on 19 March.

The Commission was due to produce an interim report by 30 July 1987 and a final report by 31 January 1988.

IAC inquiry—fruit and fruit products

The Industries Assistance Commission was conducting a broad-ranging inquiry into the fruit and fruit products industries. The DPI submission focused on the assistance needed for developing export and domestic markets, for processing and for funding research, especially in post-harvest technology.

IAC rice inquiry

A submission was presented, on behalf of the Queensland Government, to the IAC inquiry into the rice industry. The reference was to inquire whether help should be given to the rice industry for the 1987 season and subsequent seasons and the nature, extent and duration of such help.

The IAC was also asked to report on changes that the Australian rice industry experienced in competing in export markets, including the effects of overseas Government-supported agricultural policies; on whether these changes warrant Government intervention to alter the structure of Australian industry, including growing, milling, pricing and payment arrangements; and on how such intervention might be implemented.

IAC tobacco inquiry

A submission was made, on behalf of the Queensland Government, to the Industries Assistance Commission inquiry into the tobacco and tobacco-growing industries. The inquiry was to examine progress towards meeting objectives underlying the 1984-88 Tobacco Industry Stabilisation Plan and the marketing arrangements that should apply after the 1988 season.



Continued profitability of strawberry production requires producers to improve productivity by adopting new technology and to reduce production costs by monitoring variable and overhead costs. DPI regional agricultural economists help producers to analyse their business operations and produce a range of Farm Notes that set out costs-and-returns information for crop and livestock enterprises.



The recently opened Fisherman Islands Grain Export Terminal can load 60 000 t vessels at a rate of 2200 t/hour.

DPI trade initiatives

The DPI's overseas trade and development section prepared a display for AGCHINA '86 in Guangzhou in southern China in November-December 1986. The display highlighted DPI and private sector expertise in subtropical dairying, citrus production and grain storage, handling and transportation. The display greatly interested visitors and many valuable contacts were made.

In London, the DPI's trade development officer continued to provide marketing intelligence and to arrange contacts for Queensland rural industry organisations and statutory marketing authorities wishing to expand or open new markets in Europe. This officer represented Queensland firms at several important European trade promotions, including the Royal Show in the United Kingdom and the SIAL Food Exhibition in Paris. Queensland products, including seafood, ginger, wines, peanuts and pulses, were promoted.

Significant developments in promoting horticultural exports included:

- the Queensland Government's formation of a Horticultural Export Council to advise on the best ways to boost exports;
- the introduction of direct shipping services from Brisbane to South-East Asia, west coast North America and New Zealand; and
- relaxation of the airline charter policy, as it relates to primary products, and the introduction of regular charter services from Australia to South-East Asia.

Opportunities that the above services offer for perishable commodities were drawn to exporters' attention through direct contact and through a newsletter, *Talking Exports*, which was first published in October. A short video, *The Bottom Line*, was produced to create awareness of export marketing requirements and to encourage the production of horticultural produce for the export market.

The DPI's overseas trade and development section helped produce the DPI's centenary film *The Farm Behind the Beach*. Production of other films, relating local success stories in export marketing, highlighting overseas market requirements for grain legumes and promoting Queensland fresh fruit and vegetables, was proceeding.

The Japanese forage-products market, which has the potential to develop an integrated export industry throughout eastern Australia, attracted industry and DPI attention.

Business migration inquiries increased dramatically. Nearly 30 applications, representing an intended investment in Queensland of almost \$A20m, were directed to the DPI's overseas and trade development section.



As the Queensland ornamental industry expands, growing and marketing techniques become more sophisticated. The DPI advises growers on all stages of producing and marketing a crop. In particular, DPI agricultural economists provide important information on costs and profitability of production.

Financial counselling

The Queensland Government established a farm financial-counselling service as a significant new initiative to counsel individual farmers in financial difficulty. Seven counsellors were appointed to the DPI's economic services branch at Roma, Dalby, Goondiwindi, Toowoomba, Biloela, Bundaberg and Innisfail. Two more counsellors were to be located at Ayr and Ingham in early 1987-88.

PNG export tree-crop study

Agricultural economists completed the largeholder sector of the Papua New Guinea Export Tree Crop Study, funded by the Australian Centre for International Agricultural Research (ACIAR) over a 3-year period. The objectives were to develop a suitable low-cost and sustainable method of obtaining economic information for the PNG coffee, copra and cocoa industries. A paper on the topic was presented at the Australian Agricultural Economics Society Conference in Adelaide in February.

PNG ley farming evaluation

The DPI's economic services branch coordinated a multi-disciplinary team of DPI specialists in agricultural economics, beef-cattle production, grain and pasture production, and agricultural engineering to evaluate the potential for grain and livestock production development in Papua New Guinea. The team prepared a comprehensive report for the funding agency, the Australian Development Assistance Bureau (ADAB), which proposed a training and developmental-research plan to promote grain and livestock production in PNG.

Citrus model

A citrus-farm financial model was developed, in consultation with a sample of Central Burnett citrus producers, to assess farm profitability under a range of prices and yields for multiple citrus varieties. The computerised model is designed for extension officers to use in helping citrus producers prepare farm-development budgets. Producers who have microcomputers and the relevant software can also use the model on their farms.

Whole-farm business analysis

Detailed financial analyses of farming businesses were undertaken for almost 30 cooperating producers from four districts in the Central Highlands including the Emerald Irrigation Area. The Agricultural Business Research Institute, at the University of New England, Armidale, processed cash receipts, expenditure and other farm details. Each producer received processed management reports, which were discussed with the local DPI agricultural economist to pinpoint management shortcomings and to develop whole-farm plans. Individual farm data were averaged to provide a useful guide to costs and investment levels for farms in a range of Central Highlands farming districts.

Alternative crop profitability

The profitability of cane and horticultural production in the Bundaberg district was analysed during 1986. Subsequently, the profitability of alternative horticultural crops for viable farms throughout the State's major sugar regions were evaluated. The project was funded by the Australian Special Rural Research Fund (ASRRF), the Queensland Cane Growers' Council (QCGC) and the Committee of Direction of Fruit Marketing (COD). Information from the project will be used to help sugar producers assess the impact of diversification into horticulture or increasing farm size.

Irrigation evaluation

Economic assessments of sugar, grain and rice production were prepared for new irrigation farms to be released as part of the Burdekin River Irrigation Area, after the Burdekin Dam's completion. The study confirmed that farm sizes adopted in 1983 were still appropriate, but highlighted an increased sensitivity of farm profitability to variations in initial land and headworks charges, the cost of irrigation water and the extent of cleared land.

A joint economic evaluation of proposed dams at Cave Hill (near Cloncurry), Teviot Brook (at Boonah) and Broadwater Creek (near Stanthorpe) were undertaken by the DPI and the QWRC.

Coffee study

An economic study of far north Queensland coffee production was undertaken. The report examined likely investment levels for a 20 ha coffee plantation, cultural practices, operating costs and prices. To establish a commercially viable plantation, investment levels were estimated to exceed \$12,000/ha, excluding outlays on land, basic farm machinery and processing equipment.

Mango marketing

Because of predicted substantial increases in mango production, DPI marketing officers were developing a marketing plan for the mango industry. Market research was undertaken in the major domestic markets of Brisbane, Sydney, Melbourne and Adelaide and a first report was released. A final report was due towards the end of 1987.

Lychee marketing

Agricultural economists, in conjunction with north Queensland lychee producers, continued to explore ways of successfully marketing the rapidly expanding lychee crop. The successful New Zealand kiwi-fruit marketing model was examined for its applicability to lychee marketing. Help was given to grower-led investigations into cooperative or company ownership of post-harvest handling facilities and assessment of potential export markets.

Bankers field days

The DPI's economic services branch continued its liaison commitment to farm credit providers by organising field days for bankers on the Darling Downs, in the Maranoa district and at Goondiwindi. The field days give bankers an insight into the physical and financial performance of district farms and a forum in which to discuss general rural-industry problems with DPI extension staff and primary producers.



Postharvest mango experiments examine the storage characteristics of mango fruit. Because of predicted big increases in mango production, DPI marketing officers are developing a marketing plan for the mango industry.

Seed analysis

Seed-testing samples decreased to 8043, well below the average number of samples (11 500) tested between 1981 and 1986. Samples from farmers and merchants, in particular, declined owing to the general rural-economy downturn and increased private testing. Official samples increased to 1277 compared with 961 in 1985-86.

An increased area of 3566 ha was registered for certified seed production, a record area for certified seed crops other than sorghum. Most of the increase was in pasture-seed production.

Registration of areas for callide rhodes grass production almost doubled to 2433 ha. A sunflower seed-certification scheme was established to service an export trade in hybrid sunflower seed to the EEC, and exports of small quantities of certified seed began.

Agricultural standards

Seventy-five examinations, involving 150 applicants for commercial operator's licences and five applicants for pilot chemical-rating licences, were held in 27 different centres throughout Queensland. Three applications for permits to distribute certain restricted herbicides in hazardous areas were approved. Thirty-one complaints of herbicide damage were received and investigated.

A total of 3035 applications to register agricultural chemicals were received, a slight increase on the 1985-86 total. Applications for initial registration fell by 394. This was attributed to a decrease in the number of wholesale dealers.

Clearances were issued for 32 new agricultural chemicals by the Technical Committee on Agricultural Chemicals (TCAC). Much time was spent liaising with the National Health and Medical Research Council in the continuing review of health aspects of agricultural and veterinary chemicals. Help was given to the DPI member of the Technical Committee on Veterinary Drugs (TCVD).

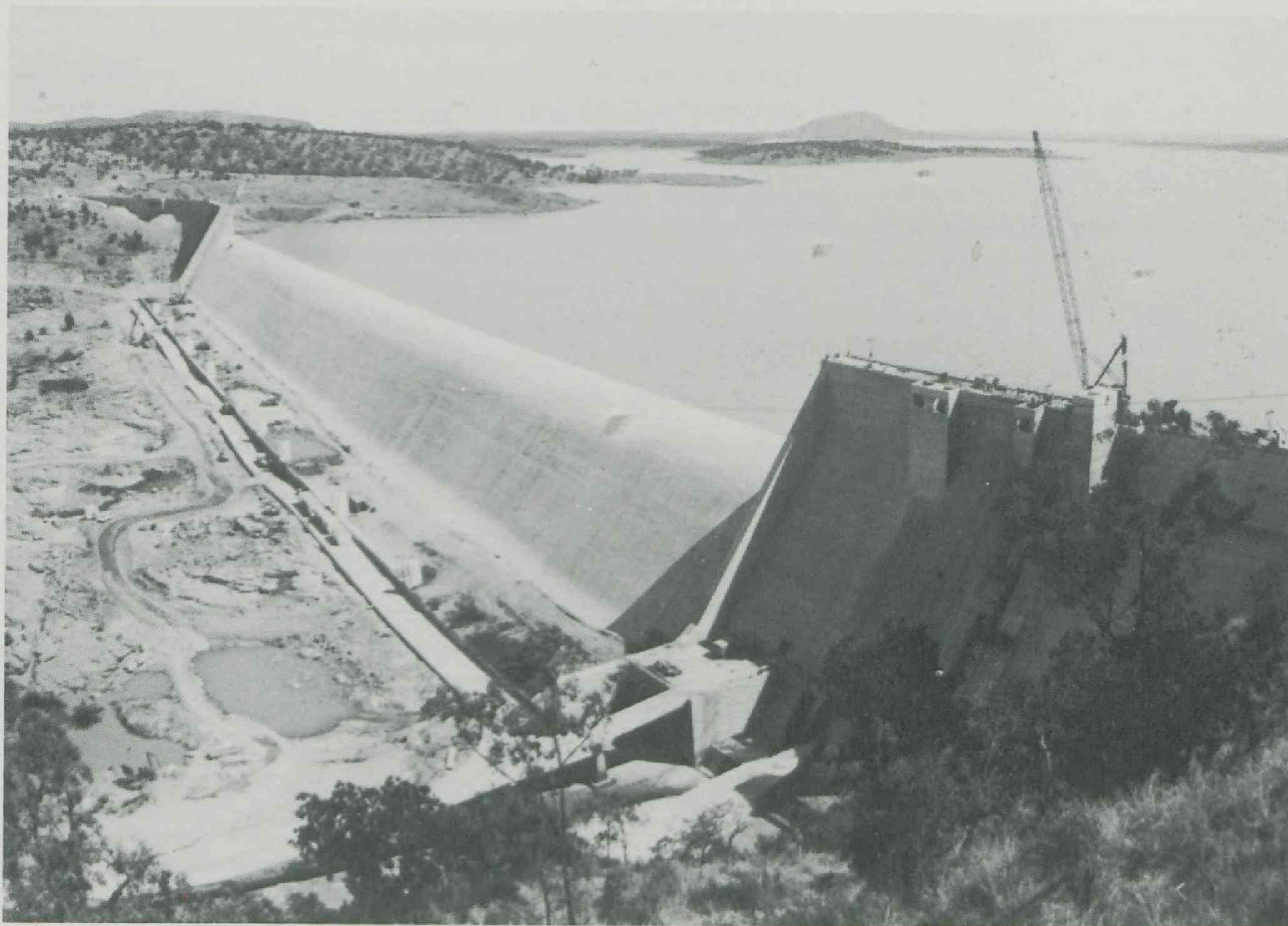
Approvals for a number of uses for aldrin, BHC, DDT, dieldrin, heptachlor and lindane were cancelled in accordance with the Standing Committee on Agriculture's decision to withdraw agricultural uses of persistent organochlorine insecticides by 1990.

Responsibility for initiating disposal of unsound produce at the Brisbane Markets was shifted from the DPI to the Commercial Sellers (Agents).

Fruit maturity testing at the Brisbane Markets increased, with a total of 2014 samples tested compared with 1845 samples in 1985-86. Avocados, citrus, grapes, mangos, pineapples and rockmelons were the main fruits tested.

Development of uniform export-grade standards, based on OECD international standards, was continued for lychees, custard apples and tomatoes. Standards set for mangos and avocados integrated domestic- and export-grade standards.

Extensive changes were made to the *Agricultural Standards Regulations 1984* affecting the standards for seed, fertilisers, stock foods and stock medicines.



Water stored in Lake Dalrymple behind the massive Burdekin Falls Dam will be used to irrigate 45 000 ha of new agricultural land in the Lower Burdekin Area. DPI economic services branch officers investigated the economics of alternative size blocks for release as irrigation farms.

Legislation

New Acts

The Minister for Primary Industries introduced six Bills into Parliament.

■ *Wheat Pool Act and Another Act Amendment Act 1986*

The provisions of this amendment Act have enabled the State Wheat Board to make an annual contribution towards wheat research in lieu of the voluntary levy scheme. This provides a higher level and more equitable funding source of wheat research in Queensland.

Research funds are used in areas such as the wheatbreeding programme, which is based at the Queensland Wheat Research Institute. In recent years, market place demands have shown that wheat varieties need to be adaptable to a range of environmental conditions.

■ *Regulation of Sugar Cane Prices Act Amendment Act 1986*

This amendment Act contained extensive deregulation measures that are providing considerable economic benefits to growers.

The amendments involve the freeing up, or deletion of, formal approval mechanisms concerning transfer of assignments (with or without land) and transfer of peaks (with or without assignment).

For the sale of sugar-cane farms as going concerns, no approval is now required by either the Central Board or a local board to effect the transaction.

Furthermore, a local board, upon application, may approve the inclusion for canegrowing of further suitable lands not exceeding 15% of the applicant canegrower's assignment provided that only an area equivalent to the original assignment is harvested in any one season. This procedure is known as roaming.

Perhaps the most significant amendment is that the Act now recognises that a canegrower has a property right in his assignment that can be transferred. This right had been assumed for many years but had not existed in law.

■ *Farm Produce Marketing Act Amendment Act 1986*

This amendment Act was designed to produce a more equitable system of payments and financial control between growers and selling agents and merchants.

One of the main changes is the requirement that farm-produce commercial sellers, acting solely as merchants, are required to hold a fidelity bond that improves the protection for growers against possible default by commercial sellers acting as merchants.

The system of issuing licenses (all farm-produce commercial sellers or wholesalers of fruit and vegetables in Queensland are now required to be licensed) has been streamlined by taking such responsibility away from the Clerk of the Magistrates Court and placing it with the Registrar of Farm Produce Commercial Sellers.

A further amendment removes the previous severe penalty of automatic ineligibility for a farm-produce commercial seller's holding a licence for 5-years, if convicted for a minor offence against the Act.

The Act also sets out further guidelines on merchant transaction, price agreements and on the time periods in which merchants must pay growers.

■ *Sugar Milling Rationalisation (Far Northern Region) Act 1987*

This Act is designed to make possible reasoned rationalisation of sugar milling operations in far north Queensland and also to enable the taking up of extensive joint State-Commonwealth concessional finance available for that purpose.

Specifically, the Act provides for the Goondi Mill's exemption from crushing for the 1987 season and beyond, and, after the mill's closure, re-zoning Goondi's assigned lands to the Babinda and Mourilyan mills.

■ *Sugar Milling Rationalisation (Far Northern Region) Act Amendment Act 1987*

After passage of the Principal Act and during the settling of the sale of Goondi Mill, it was decided that the buyers' right to use existing easements for transporting cane to their mill, as provided for in the Act, should be more clearly defined. To avoid further delays in the rationalisation programme as from the 1987 season, the Principal Act was duly amended.

■ *Sugar Acquisition Act Amendment Act 1987*

This amendment extends, until 30 June 1990, the operation of certain provisions under the Principal Act relating to the acquisition, marketing, delivery, treatment of, payment for, storage and disposal of each season's raw sugar.

Acts and Regulations

The Minister for Primary Industries administers 70 Acts of Parliament and 69 sets of Regulations, dealing with subject matter that ranges from artificial breeding of livestock to the wine industry.

Regulation Revocation Programme

Stage I of the Regulation Revocation Programme was successfully completed by 30 June 1987. Of the 32 sets of regulations reviewed during Stage I, seven sets were re-enacted after updating and redrafting to reflect present requirements while 11 sets lapsed. A further nine sets of regulations were permanently exempted from further review while five sets were granted temporary exemption to allow industry discussion and consultation to be completed. These will be included in Stage II of the Programme.

Acts

Agricultural Chemicals Distribution Control Act 1966-1983
Agricultural Standards Act 1952-1981
Apiaries Act 1982
Artificial Breeding of Stock Act 1979
The Banana Industry Protection Acts, 1929-1937
Brands Act 1915-1979
Brands Act & Another Act Amendment Act 1974
Brands Act & Diseases in Stock Act Amendment Act of 1941
Bread Industry Committee Act 1979
Brisbane Milk Board Extension Act 1977
Canned Fruits Marketing Act 1981-1985
Chicken Meat Industry Committee Act 1976
City of Brisbane Market Act 1960-1985
The Cotton Industry Acts 1923-1926
Dairy Produce Act 1978-1979
Dairy Produce Acts & Other Acts Amendment Act of 1934
Dairy Products Stabilisation Act Repeal Act 1981
Deer Farming Act 1985
Diseases in Plants Act 1929-1972
Exotic Diseases in Animals Act 1981-1982
Farm Produce Marketing Act 1964-1986
Filled Milk Act 1958-1982
Fisheries Act 1976-1984
Fishing Industry Organization and Marketing Act 1982-1985
Fruit and Vegetables Act 1947-1972
Fruit Marketing Organisation Act 1923-1985
Grain Research Foundation Act 1976
Hen Quotas Act 1973-1985
Liens on Crops of Sugar Cane Act 1931-1981
Local Sugar Cane Prices Board Confirmation Act of 1915
Margarine Act 1958-1982
Margarine Acts & Another Act Amendment Act 1974
Meat Industry Act 1965-1984
Milk Supply Act 1977-1986
The Peanut Industry Protection and Preservation Acts 1939-1965
Poultry Industry Act 1946-1984
Primary Producers' Co-operative Associations Act 1923-1986
Primary Producers' Organisation and Marketing Act 1926-1985
Primary Producers' Organisation and Marketing Act & Another Act Amendment Act 1985
Primary Producers' Organisation and Marketing Act Amendment Act of 1946
Primary Producers' Organisation and Marketing Act Amendment Act 1954
Primary Producers' Organisation and Marketing Act and Another Act Amendment Act of 1965
Primary Producers' Organisation and Marketing Act & Other Acts Amendment Act 1941-1973
Primary Producers' Organisation and Marketing, Fruit Marketing Organisation, Wheat Pool and Diseases in Plants Acts Amendment Act 1930-1984
Queensland Grain Handling Act 1983-1986
Regulation of Sugar Cane Prices Act 1962-1986
Rice Industry Stabilization Act 1973
Soil Conservation Act 1986
The Soil Survey Act 1929
Stock Act 1915-1986
Stock Act & Another Act Amendment Act 1978
Stock Act & Other Acts Amendment Act 1973
Stock Acts Amendment Act of 1965
Sugar Acquisition Act 1915-1987
Sugar Board Act 1966-1982
Sugar Experiment Stations Act 1900-1983
Sugar Experimentation Stations Act & Other Acts Amendments Act of 1941
Sugar Milling Rationalization (Far Northern Region) Act 1987
Swine Compensation Fund Act 1962-1975
Tobacco Industry Protection Act 1965-1985
Tobacco Industry Stabilization Act 1965-1972
Torres Strait Fisheries Act 1984

Upper Burdekin Co-operative Associations Limited Validation Act 1979
Veterinary Surgeons Act 1936-1986
Wheat Delivery Quotas Act 1970-1974
Wheat Industry Stabilisation Act & Another Act Amendment Act 1978
Wheat Marketing Act 1984
Wheat Pool Act 1920-1986
Wheat Pool (Validation of Proclamations) Act 1983
Wine Industry Act 1974-1982

Regulations

Agricultural Chemicals Distribution Control Regulations of 1970
Agricultural Standards Regulations 1984
Apiaries Regulations 1983
Artificial Breeding of Stock Regulations 1981
Banana Industry Protection Regulations 1987
Brands Regulations 1987
Bread Industry Committee Regulations 1980
Brisbane Market Trust By-laws 1982
Brisbane Market Trust (Appointment of Licensed Buyers Representative) Regulations 1982
Brisbane Market Trust Form of Accounts Regulations 1985
Brisbane Market Trust Inscribed Stock Regulations of 1962
Chicken Meat Industry Committee Regulations 1977
Committee of Direction Levy Regulations of 1973
Dairy Produce Regulations 1980
Deer Farming Regulations 1985
Diseases in Plants Regulations 1987
Exotic Diseases in Animals Regulations 1981
Farm Produce Marketing Regulations 1984
Fisheries Regulations 1977
Fishing Industry Organization and Marketing Regulations 1983
Fruit and Vegetables Grading and Packing Regulations 1979
Queensland Commercial Fishermen's Organization Regulations 1984
Queensland Fish Board Regulations 1984
Regulations (untitled) under the Fruit Marketing Organisation Act 1923
Regulations (untitled) to the Hen Quotas Act 1973-1985
Meat Industry Regulations of 1973
Milk Supply Regulations 1978
Poultry Industry Regulations of 1946
Primary Producers' Co-operative Associations Regulations 1987
Regulations under the Primary Producers Organisation and Marketing Act 1926-1985:
Commodity Marketing Boards Elections Regulations 1987
Atherton Tableland Maize Marketing Board Levy Regulations of 1936
Barley Marketing Board Hail Insurance Levy Regulations of 1930
Central Queensland Egg Marketing Board Administrative Levy Regulations of 1947
Central Queensland Grain Sorghum Marketing Board Levy Regulations of 1970
Cotton Marketing Board Hail Insurance Regulations 1985
Cotton Marketing Board General Reserve Revolving Fund Regulations of 1965
Council of Agriculture Regulations of 1936
Egg Marketing Board Regulations
Navy Bean Marketing Board Levy Regulations of 1970
Northern Pig Marketing Board Exemption Regulations of 1969
Peanut Marketing Board Levy Regulations of 1927
Queensland Cane Growers Council Regulations 1987
Queensland Commercial Pig Producers State Council Regulations 1978
Queensland Dairymen's State Council Regulations of 1947
Sugar Levies 1979-1981 Seasons
Sugar Levies 1983 Season
Sugar Levies 1984 Season
Sugar Levies 1985 Season
Sugar Levies 1986 Season
Sugar Levies 1987 Season
Tobacco Leaf Marketing Board Levy Regulations 1948
Queensland Grain Handling Authority (Elections) Regulations 1983
Queensland Grain Handling Authority By-laws 1984
Identification of Stock Regulations 1986
Pet Shops Regulations of 1966
Pullorum disease Control Regulations of 1970
Stock Regulations of 1935
Regulation of Sugar Cane Prices Regulations of 1963
Sugar Experiment Stations Regulations 1987
Tobacco Industry Protection Regulations of 1966
Regulations (untitled) under the Tobacco Industry Stabilisation Act 1965-1972
Veterinary Surgeons Regulations 1986
Regulations to the Wheat Delivery Quotas Act 1970-1974
Exemption from Delivery of Wheat Regulations 1984
State Wheat Board Hail Insurance Reserve Fund Regulations of 1926
State Wheat Board By-laws of 1926
State Wheat Board Hail Insurance Scheme Regulations 1972
Swine Compensation Fund Regulations of 1962
Wine Industry Regulations 1979

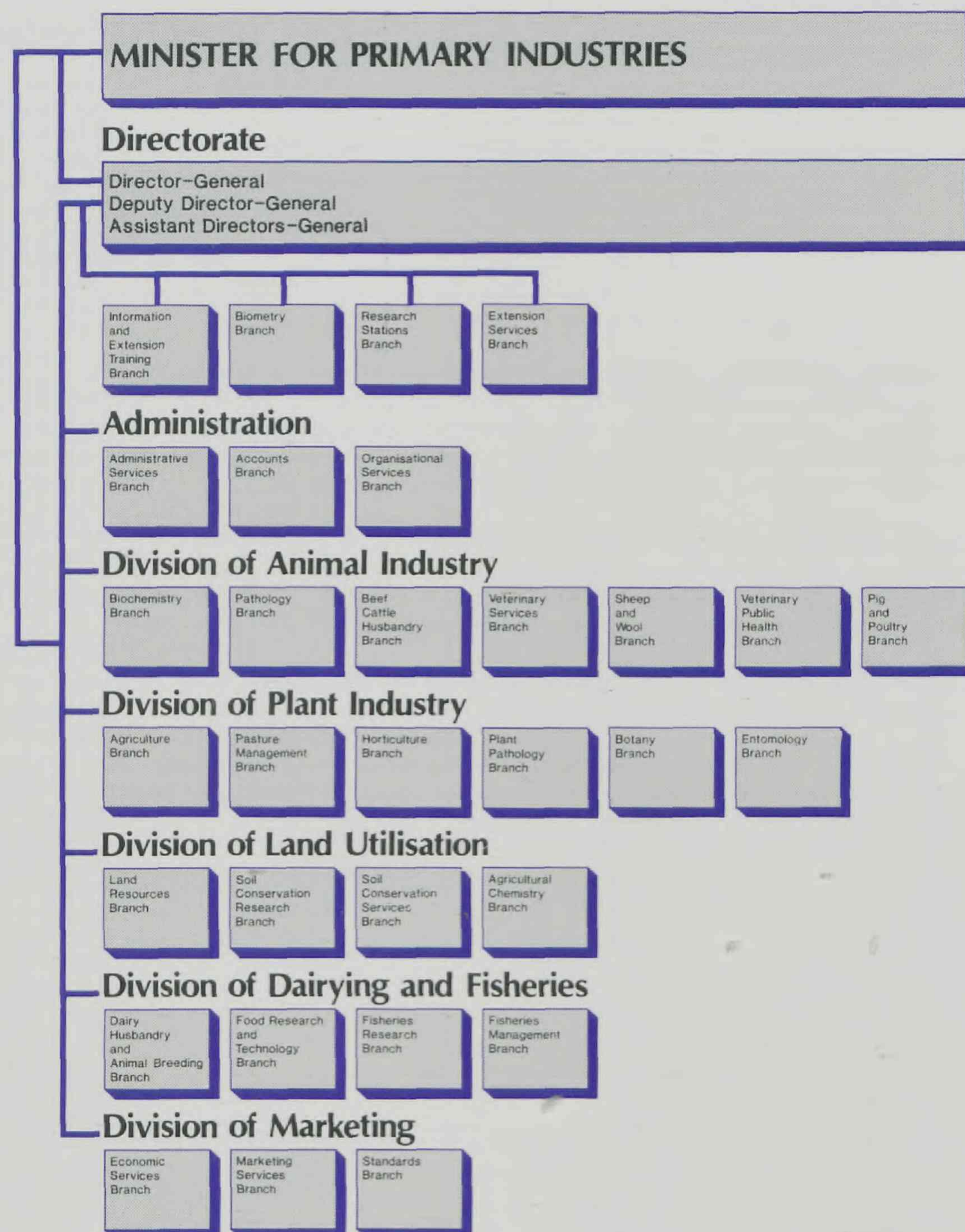
Organisation

The Queensland Department of Primary Industries is responsible to the Minister for Primary Industries, who is also responsible for a wide range of statutory authorities established under Acts of State Parliament.

A director-general heads the Department assisted by a deputy director-general with the support of assistant directors-general. Collectively called the directorate, they are responsible for planning and development, research, extension, regulation and administration.

Responsibility for technical coordination and performance rests with five divisional directors, each supported by a group of branches and by senior officers at centres throughout the State. A director heads each branch within a division. The DPI has five divisions and 31 branches.

At 30 June, the DPI's approved public service staff establishment was 2 955, which included some 400 positions funded from Commonwealth and rural industry sources. If officers' major activities are considered, about 20% are involved in administrative and clerical services; about 40% in research and resource activities; about 30% in regulatory and service work; and about 10% in fulltime extension. Many research and regulatory staff also have some extension duties.



Role

The DPI's overall role is to foster and assist the development of Queensland's rural industries while conserving the State's natural resources for the use of future rural producers.

At the same time, it provides a service to Queensland consumers by assuring the quality of food resources.

The DPI fulfils this role through its work in three major areas: research, extension services and regulatory activities. As a consequence, the DPI is involved in activities at all production levels, in processing and marketing, and in consumer acceptance and protection.

Research

The DPI's research activities are directed at solving a wide range of production, marketing and developmental problems. Research that provides practical solutions is emphasised.

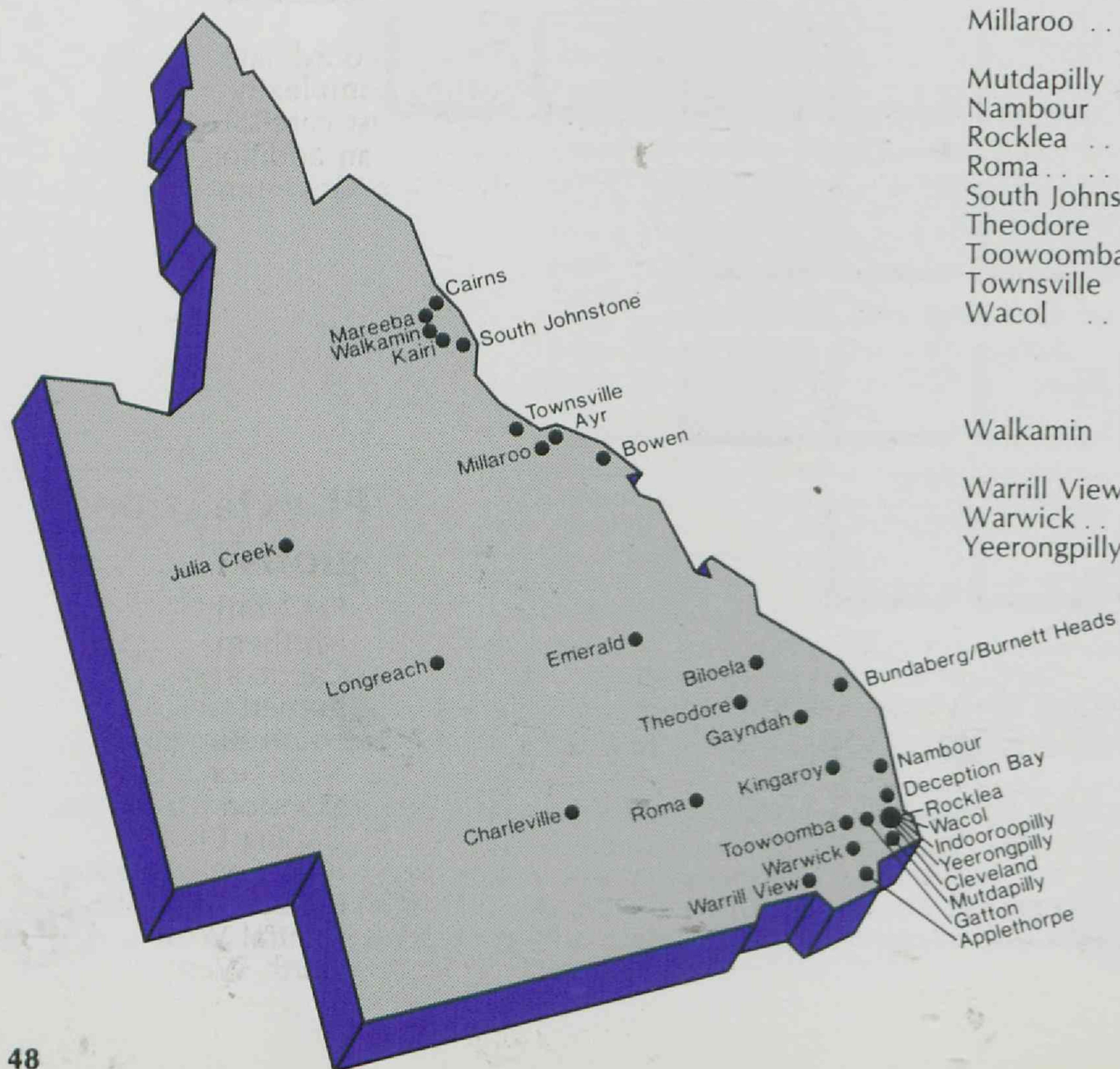
Work is administered through branches and divisions for a research stations board that decides priorities. Although research work is not regionalised, regional groups are established within some branches to coordinate activities.

Research is carried out by:

- research stations administered by the research stations board, usually multi-disciplinary and involving a number of branches;
- research stations in rural areas operated by branches, usually serving a particular industry (for example, fisheries);
- central laboratories operated by branches with a large service/diagnostic component and a variable amount of discipline-oriented research (for example, pathology and entomology); and
- field experiments and surveys.

DPI research establishments

Applethorpe	Granite Belt Horticultural Research Station*
Ayr	Ayr Research Station
Biloela	Biloela Research Station
Bowen	Bowen Horticultural Research Station*
Bundaberg	Bundaberg Research Station
Burnett Heads	Fisheries Research Centre
Cairns	Northern Fisheries Research Centre Kamerunga Horticultural Research Station
Charleville	Charleville Pastoral Laboratory Croxdale Field Station
Cleveland	Redlands Research Station Redlands AI Export Centre Redlands Horticulture Centre Redlands Poultry Research Centre
Deception Bay	Southern Fisheries Research Centre
Emerald	Emerald Field Station
Gatton	Gatton Research Station
Gayndah	Brian Pastures Research Station
Indooroopilly	Agricultural Research Laboratories
Julia Creek	Toorak Sheep Research Station
Kairi	Kairi Research Station
Kingaroy	J. Bjelke-Petersen Research Station Redvale sub-station
Longreach	Arid Zone Institute
Mareeba	Mareeba Research Laboratories Southedge Research Station
Millaroo	Millaroo Research Station Swan's Lagoon Beef Cattle Research Station
Mutdapilly	Mutdapilly Research Station
Nambour	Maroochy Horticultural Research Station
Rocklea	Animal Husbandry Research Farm
Roma	Roma Field Station
South Johnstone	South Johnstone Research Station
Theodore	Brigalow Research Station
Toowoomba	Queensland Wheat Research Institute
Townsville	Oonoonba Animal Health Station
Wacol	AB Centre Dairy Herd Improvement Laboratory Pig Research Centre Tick Fever Research Centre
Walkamin	Walkamin Research Station Freshwater Fisheries Research Unit
Warrill View	Warrill View Research Station
Warwick	Hermitage Research Station
Yeerongpilly	Animal Research Institute



Problem identification

The DPI liaises closely with industry and other government organisations in identifying problems and setting priorities. This occurs through daily contact with producers in the field and, more formally, through contact with organisations at local, state and national levels.

In addition, special advisory committees with producer representatives are set up from time to time to investigate and report on particular problems. One such committee was formed under the national Brucellosis and Tuberculosis Eradication Campaign. The committee's work resolved problems associated with compensation payments and destocking provisions on cattle properties in the remote areas of the Gulf country and Cape York Peninsula. Consultation with industry also led to a realignment of the cattle-tick line separating tick-free from tick-infected areas of the State. The development of export markets, particularly for horticultural produce, was another benefit resulting from industry consultation.

Consultative committees operate at the major country research stations. Branch and DPI priorities for research, extension and regulation are made through these consultative activities, except when government priorities have overriding importance. The DPI also liaises with other organisations in researching problems, particularly with the CSIRO and universities.

DPI attendance at national review conferences and workshops helps coordinate State priorities and activities within national programmes supporting the rural sector.

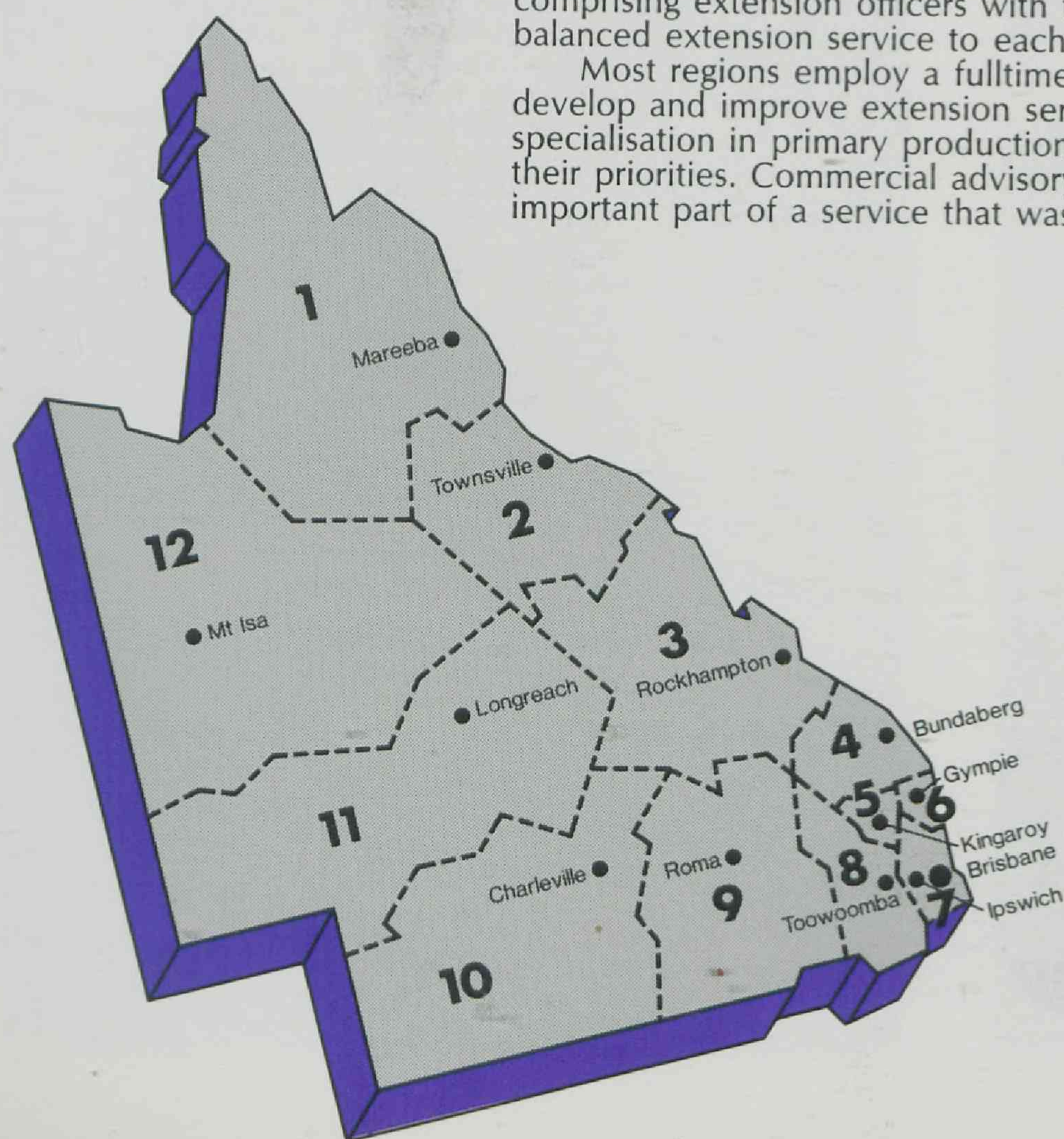
Extension

The DPI extension service helps Queensland primary producers improve their productivity through adopting new and improved practices, and through adapting existing resources using better methods. The extension service helps keep primary production efficient, thereby ensuring better-quality and more-economical food and fibre products for all the community. It also advocates practices to ensure long-term use of the State's natural resources.

The DPI services all rural industries except timber and (for some purposes) sugar. Employing services ranging from enquiry centres and farm visits to educational programmes, the DPI operates a coordinated, regionally-based extension system, which an extension services branch administers within policies established by an extension services board.

Within each region, the units of coordination are industry extension groups, comprising extension officers with the varied technical expertise needed to provide a balanced extension service to each industry.

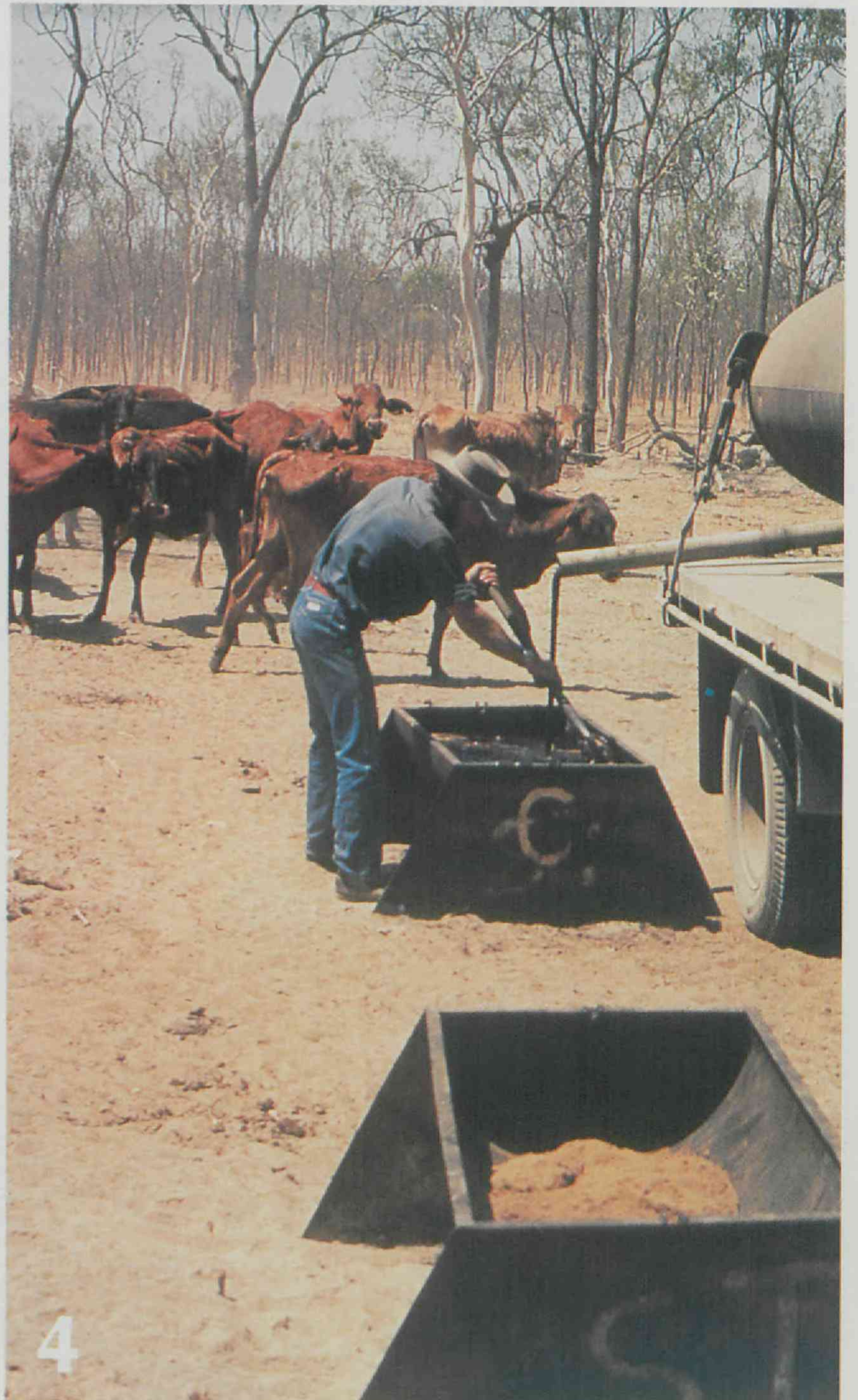
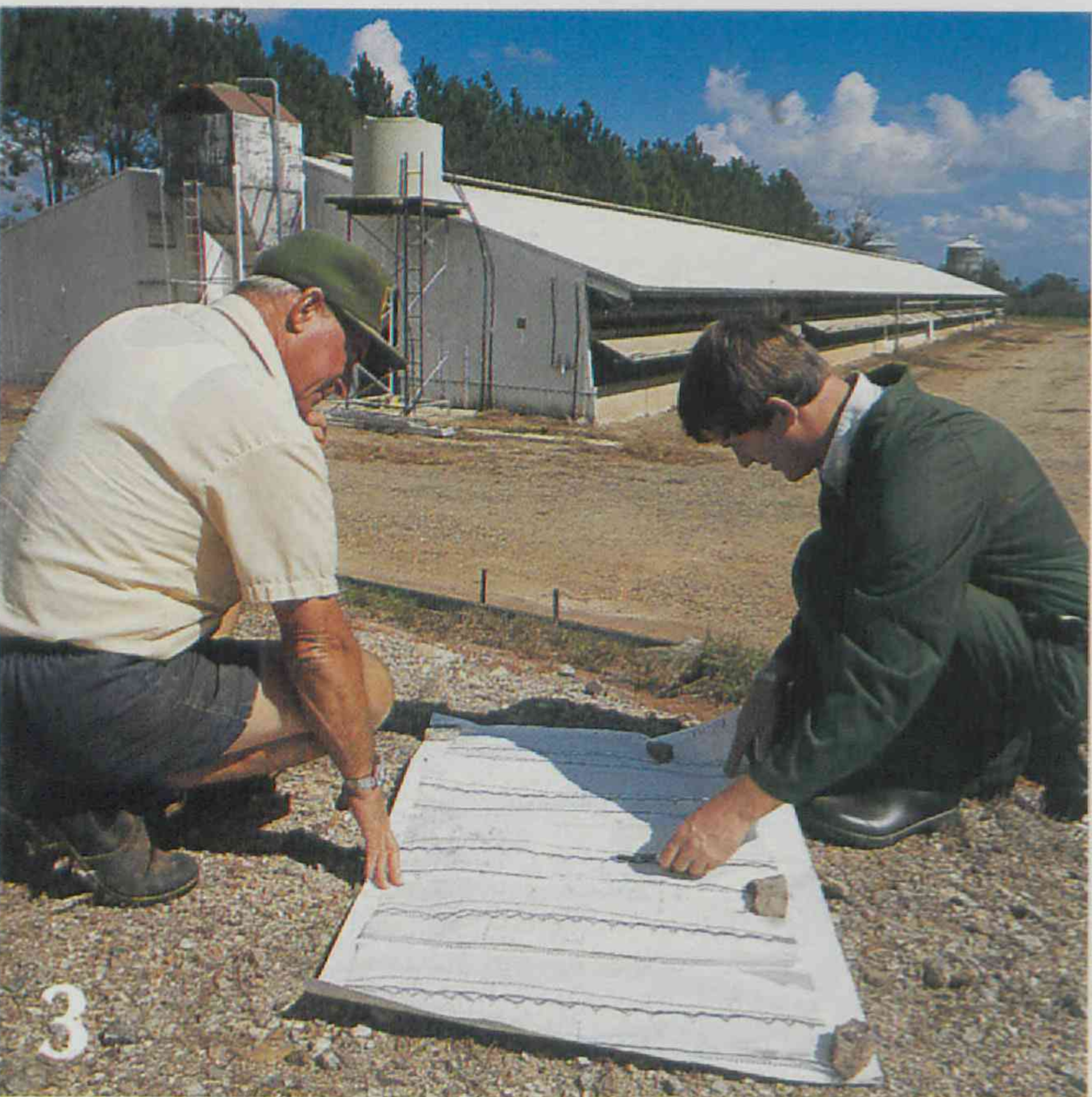
Most regions employ a fulltime regional extension leader to coordinate, assess, develop and improve extension services for farmers. Increasing complexity and specialisation in primary production mean that extension staff must carefully choose their priorities. Commercial advisory services to farming are now an additional important part of a service that was once expected mainly of the Government.

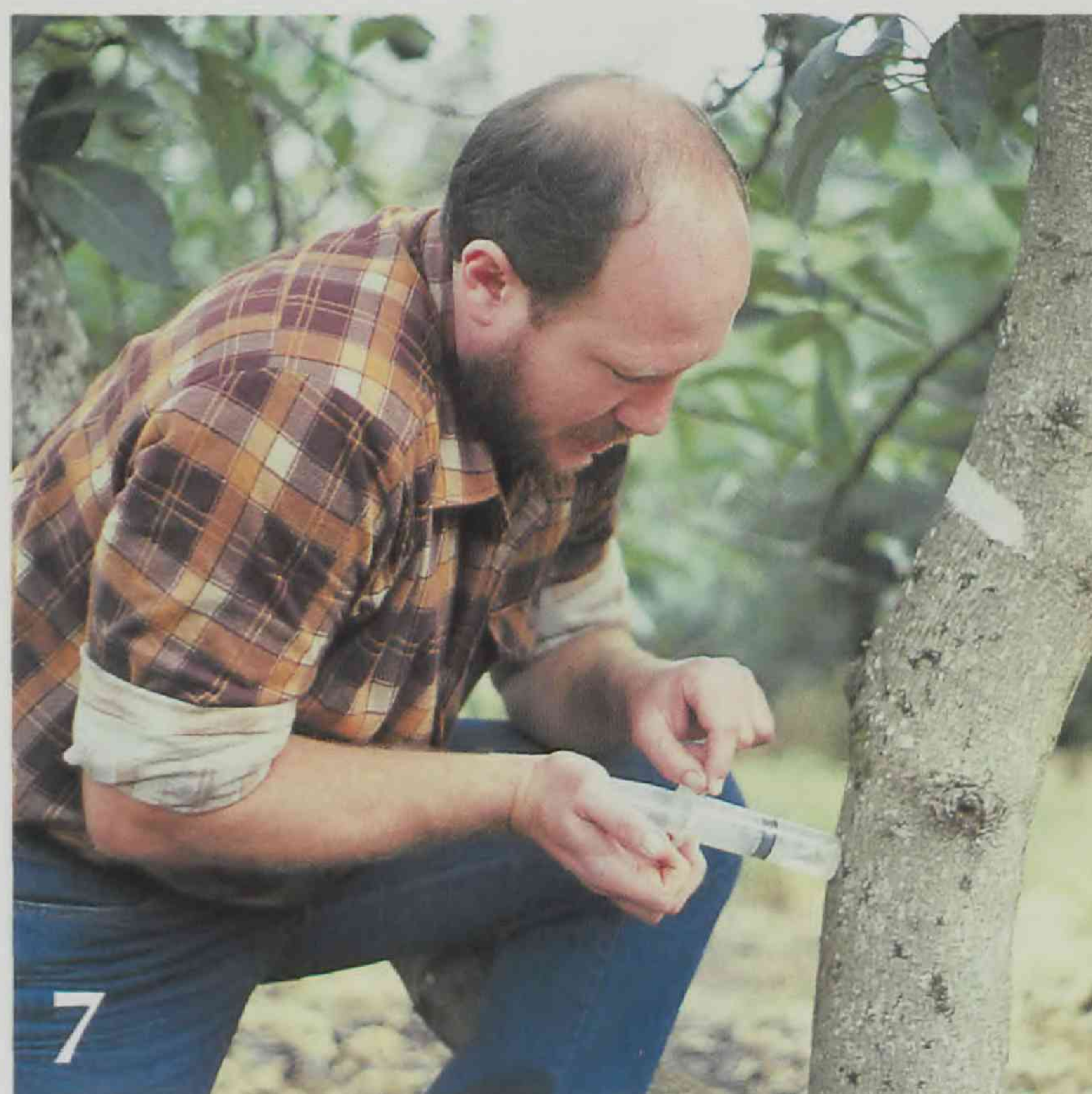


DPI extension regions

1. Far Northern
2. Northern
3. Capricornia
4. Burnett
5. South Burnett
6. Near North Coast
7. Moreton
8. Darling Downs
9. Near South West
10. Far South West
11. Central West
12. North West

Queensland Primary Industries





1

Improved cashmere production and the use of goats to control woody weeds are being studied at the DPI's Croxdale Field Station, Charleville.

2

Topsy Creek and surrounding wetlands, in the Gulf of Carpentaria. This estuary is a highly productive barramundi, mud crab and juvenile prawn habitat, and is one of several Gulf rivers and creeks that the DPI is assessing for declaration as a fisheries reserve.

3

A DPI field officer uses shed temperature recordings to identify problems in shed management for a meat chicken grower.

4

Studies at Swan's Lagoon Research Station, near Ayr, in north Queensland, have refined drought-feeding formulations based on molasses.

5

A DPI food technologist conducts routine quality assessment on the flesh of sashimi-grade yellowfin tuna destined for the Japanese market.

6

A DPI extension agronomist checks soil moisture levels with a neutron moisture meter in a soybean irrigation trial at Pittsworth on the Darling Downs.

7

A DPI experimentalist injects phosphorous acid into the trunk of an avocado tree with phytophthora root rot. This DPI innovation has world-wide significance for saving phytophthora-infected trees.



Regulation

The Acts administered by DPI regulatory staff are designed to protect the consumer, the producer and the environment. They cover disease control, product hygiene and quality, and the orderly marketing of produce. Regulatory staff are concerned with Acts such as the Diseases in Plants Act, the Dairy Produce Act, the Wheat Marketing Act, the Torres Strait Fisheries Act and the Agricultural Chemicals Distribution Control Act.

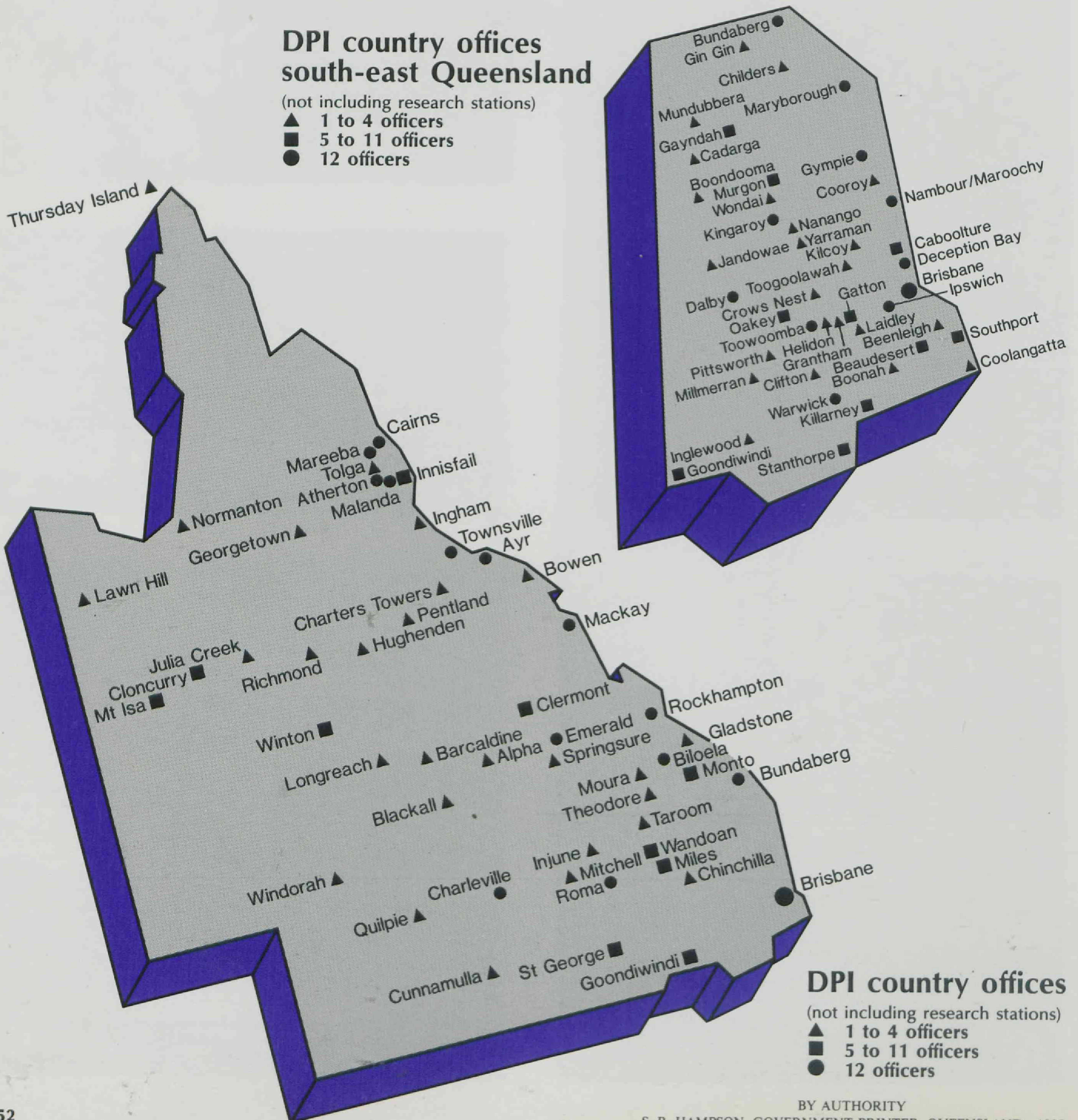
DPI officers administer Acts for both the Queensland and Commonwealth Governments. Their duties include:

- responsibility for quarantine of plants and animals as the agent for the Commonwealth Government;
- supervising meat slaughtering and meat quality for the domestic market;
- recommending in relation to declarations of drought-affected areas;
- supervising the activities of rural marketing boards and co-operatives;
- testing of seeds, chemicals and fertilisers to ensure they conform with labelling requirements;
- registering and administering a diverse range of farming enterprises, including aquaculture and deerfarming; and
- assuring the quality of all rural produce.

DPI country offices south-east Queensland

(not including research stations)

- ▲ 1 to 4 officers
- 5 to 11 officers
- 12 officers



DPI country offices

(not including research stations)

- ▲ 1 to 4 officers
- 5 to 11 officers
- 12 officers

