Hon. N. J. Turner, M.L.A.

QUEENSLAND DEPARTMENT OF PRIMARY INDUSTRIES ANNUAL REPORT 1984-85

Presented to Parliament by command

As Minister for Primary Industries, I am pleased to provide this annual report, which highlights my Department's activities during 1984-85.

R J Turner.

(N. J. Turner)
Minister for Primary Industries

68677—A. 55—1985

THE YEAR REVIEWED

Rural production

In 1984-85 the gross value of the State's rural production was $3058m, a decrease of 1% on 1983-84.

Low world sugar prices, increased production costs (particularly for fuel), and continuing drought in western areas reduced the chance of full recovery in the rural sector from the serious financial downturn of the early 1980s.

Seasonal conditions

When 1984-85 began, only eastern Bowen Shire was declared drought-stricken. However, with summer rains generally failing, pasture conditions deteriorated and large-scale destocking occurred in western areas. Eastern and far northern areas enjoyed much better seasonal conditions than western areas.

By the end of the year, six shires—Isisford, McKinlay, Murweh, Paroo, Richmond and Winton—had been declared drought stricken, while parts of the shires of Blackall, Ilfracombe and Longreach had been so declared. In addition, many Individual Drought-stricken Property Declarations existed in surrounding shires.

In early June, some relief rain fell in the main winter-grain production areas, which had been drought affected.

Assistance schemes and subsidies

Expenditure on drought-relief assistance measures was less than for 1983-84. This was due mainly to better seasonal conditions during the earlier part of the year. Assistance for drought and other disasters amounted to $10.5m (previous year $62m). The main items of expenditure were:

Rail and freight rebates	**2 242 000**
Cost of agistment	**183 000**
Fodder subsidy	**15 000**
Drought relief loans for primary producers	**3 667 000**
Other natural disasters loans	**4 410 000**

During the year several local disasters, including wind storms, hail storms, severe frosts and bushfires, occurred in rural areas. Only one of these, the severe hail storm in south-east Queensland on 18 January, was sufficiently widespread to qualify for help under the Commonwealth/State Natural Disaster Relief Arrangements.

The State Government subsequently set up a scheme to help producers affected by localised natural disasters. Under this scheme a property may be declared an Individual Disaster Stricken Property and be considered for concessional relief loans through the Agricultural Bank.

The scheme to subsidise hail insurance premiums for fruit growers at Stanthorpe was continued for a second year. Crops to the value of $4.8m were insured by 159 growers. Subsidy payments totalled $233,000.

Research in the department

The Department is recognised as a major agricultural research organisation in Australia and overseas. It uses a task-force approach to tackle research problems on a whole-industry basis rather than within the narrow confines of scientific discipline.

In 1984-85 the research budget of more than $45m supported 385 research scientists and a similar number of technical officers. Research facilities included 25 research stations, 10 central laboratories in Brisbane and 10 regional laboratories in country areas. In addition, many field-trial sites were situated on producers' properties throughout the State.

Extension developments

Conservation cropping was emphasised not only for soil and water conservation but also for economic reasons: the fuel price for cultivation work has increased relative to the price of chemicals for weed control. Because of increasing competition on markets for sugar, grain crops, pigs, poultry, dairy and many horticultural crops, attention was given to ways of reducing costs to improve profitability at the farm gate.

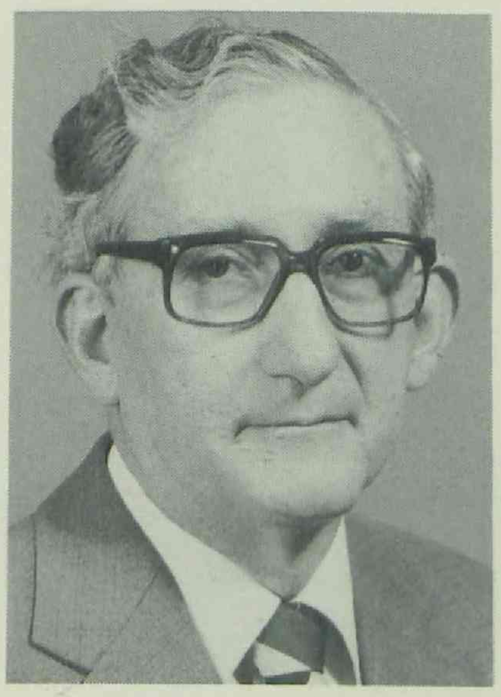
Extension staff used Farm Notes, newsletters, mass media and field days to supplement farm and office visits. Locally produced newsletters designed for specific industries were widely used to keep producers informed. Altogether, 40 different titles were sent direct to more than one-third of the State's farmers and graziers. In addition, a newsletter entitled *Fish Management News* was published for the fishing industry.

Video tapes were increasingly used as an extension medium for both producers and consumers. A total of 26 programmes were made for show displays and other outlets.

Departmental officers studied computer-based information systems accessed through telephones as ways for farmers to obtain convenient and useful information.

Bunchytop, a potentially serious disease of bananas, is kept under control through constant DPI surveillance of commercial and household plantings. This display on the disease's symptoms and dangers was set up at the open day held by the DPI's Redlands Horticultural Research Station, Ormiston, on 18 October 1984.

Dr G. I. Alexander
Director-General



DPI facilities

The Poultry Research Centre located at Redlands Research Station began operating in December. Its nutrition and poultry-breeding research will benefit the industry in Queensland. Costing $1.25m, the centre replaces old facilities at Rocklea.

A new laboratory building was completed at Kairi Research Station to centralise Atherton Tableland dairy and field-crop research. The tropical fruit industry on the Tableland will benefit from a post-harvest fruit laboratory established at Walkamin Research Station near Mareeba.

Work continued on the Arid Zone Research Institute at Longreach. The laboratories and offices site was fenced and a caretaker's house erected. Investigations were continuing to select a large grazing area for research sites for the Institute to service.

Near Roma, 30 ha were acquired for use as a field research station to serve the south-west region's expanding cropping industries. At Bundaberg, 33 ha were bought to establish a research station to examine the potential of horticultural and agricultural crops as alternative production systems to sugar. Preliminary work began on an aquaculture centre for prawn farming research on a 13 ha site acquired on the eastern side of Bribie Island.

Fire destroyed a top-floor laboratory of the Otto Madsen Dairy Research building at Hamilton in August. Heat, smoke and water damaged other parts of the building. Work was transferred to other laboratories, thereby minimising interruption to research programmes.

Computing facilities

A VAX 11/750 computer was installed in Mineral House, Brisbane, for statistical analysis of research data and simulation of agricultural systems. This computing was previously done on a CSIRO system. The computer is connected to CSIRONET, the CSIRO network, allowing staff based outside Brisbane to use it through existing lines and Brisbane users to access software and databases maintained on CSIRONET by other groups.Further UNIX-based computers, Pyramids, were ordered for the Department's Indooroopilly and Yeerongpilly laboratories to automate laboratory processes and extension information storage and retrieval.These facilities are complemented by 60 general-purpose microcomputers throughout the State.

75th Anniversary of ARI

The Department's Animal Research Institute at Yeerongpilly celebrated its 75th anniversary in November and invited rural and urban people to inspect its facilities. The Institute is recognised worldwide through its publication of scientific findings and the contribution it makes to animal science locally and internationally.

The Institute is concerned with diagnosing diseases of cattle, sheep, goats, horses, deer, pigs and poultry as well as doing research into such problems as plant poisonings and trace-element deficiencies. It also provides laboratory support for the continuing brucellosis and tuberculosis eradication campaign. Institute staff are often asked to act as consultants overseas.

Conferences and field days

Departmental officers delivered scientific papers and led discussions at rural industry conferences and field days during the year.

The conferences included the national workshop on land capability assessment for dryland annual cropping (Toowoomba), the mango workshop (Cairns), and a conference on animal welfare in the grazing industry (Brisbane).

Officers attended many field days throughout the State to help keep farmers up to date in their particular industries. A field day that the Department organised at its Pig Research Centre at Wacol in June attracted 250 people from throughout the State. Visitors saw the latest commercial equipment and technology as well as Departmental research work to increase production and reduce costs in the pig industry.

The Department's sheep and wool branch was invited to mount an exhibit at the annual 'Boonoke' Merino Stud field day at Deniliquin, New South Wales. Much of the branch's research results on blowfly control and wool production is applicable to wool producers in southern States.

Meat inspection

On 1 April the State meat-inspection service handed over its duties at export abattoirs to the Commonwealth Export Inspection Service. The move rationalised meat-inspection services and provided for a single fee at export abattoirs. State officers will continue with disease-control activities at all works and provide inspection activities in the non-export area.

Exotic diseases

An extortion threat to release foot-and-mouth disease virus into the State's livestock population was received in December. Animal industry officers were alerted and property visits by field staff increased in response to reports of diseases in stock. In all cases only endemic diseases already occurring in Australia were diagnosed.

A practical simulation exercise to control a vesicular disease outbreak was conducted in north Queensland, centred on Mareeba. The exercise examined logistic problems inherent in more remote areas and tested lines of communication between field headquarters and the Exotic Diseases Operation Centre located in Comalco House, Brisbane.

Technical displays were highlights of the 75th anniversary celebrations of the DPI's Animal Research Institute, Yeerongpilly, in November last year. This was part of the display featuring the DPI's work in pigs and poultry.

Cattle tick control

Excellent progress was made towards eradicating cattle ticks from the Maxwelton Special Quarantine Area in north-west Queensland. Tick infestation in the area is now confined to three zones adjoining the main railway line.

Fencing on the northern and southern sides of the road/rail corridor between Hughenden and Cloncurry was almost completed. This work involved nearly 375 km of new fencing and the up-grading of existing fences. It will prevent the free movement of tick-infested cattle to tick-free areas south of the railway line. In association with the tick-barrier fence, a clearing dip and yard complex was built at Maxwelton.

At Helidon, in south Queensland, construction began on a new clearing dip and yards with both rail and road access. These replace old facilities that were leased. Helidon is an important clearing point for stock entering the tick-free area of the Darling Downs.

The Commonwealth Government Community Employment Program (CEP) assisted in building the Maxwelton and Helidon facilities.

Brucellosis and tuberculosis

Queensland continued to progress with the national programme to eradicate both bovine brucellosis and tuberculosis from the State's cattle herds.Eradication was centred on remote and difficult areas of the State.

At present 99.2% of the State's breeding herds are classified as negative or free from brucellosis compared with 50% in 1979. The percentage of cattle with tubercular lesions has been reduced from 0.15% in 1975 to 0.04% in the last year.

Additional financial aid was provided for eligible graziers to help them carry out disease-eradication programmes. The loan limit was raised to $150,000 and the interest rate reduced to 4%. Graziers in remote areas who can meet mustering requirements for tuberculosis testing also receive $2/head subsidy.

Soil conservation and land management

Interest in soil conservation remained high particularly in central Queensland. However, in sugar-growing areas, demand for soil conservation work was reduced due to the economic depression in the industry. Sugar growers showed increased interest in conservation farming techniques, such as trash retention, to reduce production costs and, at the same time, soil erosion.

A combination of soil conservation structures and management techniques is required to maximise erosion control. During the year 71 000 ha of land were planned for installing soil conservation measures, an increase of 11% on 1983-84. This increase should continue into 1986 when new field officers complete their training.

Industry planning and review

Departmental officers contributed to important studies of Queensland's sugar and wheat-growing industries.

The Sugar Industry Working Party, comprising an independent chairman and representatives of the Commonwealth and Queensland governments and the sugar industry, met in May to develop an industry plan to devise long-term help for the sugar industry. The working party had to report to both governments within 100 days on a plan to enable the sugar industry to cope efficiently and competitively with the changing world market.

The Wheat Marketing Review Committee was formed in February with a representative from the State Wheat Board and the Queensland Graingrowers Association and with the director, DPI division of marketing, as chairman. Its terms of reference included: reporting on the advantages and disadvantages of Queensland's continued participation in Australia-wide wheat marketing arrangements; examining aspects of existing wheat-marketing arrangements that are disadvantageous to Queensland wheat growers; and examining storage and handling systems.

Trade development

A trade development section was formed within the Department's division of marketing to help coordinate rural export efforts. The section has contributed to the planning of 'Enterprise Queensland' missions seeking markets in Europe, Japan and China. A trade development officer was posted to the Queensland Agent-General's office in London to assess markets for Queensland's primary produce in Europe and the United Kingdom.

A DPI soil conservation officer and a landholder plan a soil conservation layout. In 1984-85, 390 Queensland landholders implemented soil-conservation measures for the first time.

AgAsia '84

A major Departmental initiative in trade promotion was successfully launched at the AgAsia '84 agricultural exhibition in Kuala Lumpur, Malaysia.

Held in August, the exhibition was a major success for Queensland agriculture with initial export sales of about $5m. Using the theme, 'Queensland—Australia's State of Tropical Agriculture', the exhibition highlighted the importance and relevance of Queensland as a supplier of goods and a leader in technology for the tropical world.

The Department's role in pioneering advances in tropical agriculture complemented the marketing approaches of many of the private-sector exhibitors.

Industrial irradiation

Industrial irradiation presents challenging and exciting alternatives in pest and disease control for a wide range of farm products. For many years, the use of gamma rays from Cobalt 60 to impart energy through irradiation has been widely used in industry. It is now being adopted for agricultural purposes in some countries.

The technique can eliminate disease-causing agents, such as salmonella, from packaged foodstuffs. It can also control fruit fly and grain weevils without harming the products that the insects infest. The technology offers consumers great benefits such as extended shelf life of foods and enhanced quality. It also offers an alternative to using chemicals in some insect-control measures of farm products.

During the year a working party of Departmental and industry representatives studied overseas developments in industrial irradiation. A detailed economic and technical analysis was being undertaken to examine its potential use on a range of primary products.

Artificial breeding

Improvement in beef prices and the importation of cattle through Cocos Island stepped up interest from the beef industry in artificial breeding. Demand for semen from dairy and beef breeds remained strong, and more than 250 000 doses were processed during the year. Most of this work is carried out at the Wacol Artificial Breeding Centre. Demand for semen from the export centre at Ormiston also increased. Approval was given in June for the export of semen to the United States. Export sales of semen of the Australian Friesian Sahiwal tropical dairy breed reached 10 000 doses.

Increasing numbers of dairy and beef producers carry out artificial breeding programmes in their own herds, and during the year 330 people were trained in appropriate techniques.

Food research

In January a food research branch was established at Hamilton to ensure better coordination of food research in Queensland and to make the best use of existing laboratory and processing facilities. Dairy-product research and fruit-and-vegetable technology were combined and expanded to include fish and meat research.

Fisheries management

The Department's fisheries management branch completed its first full year of operation and firmly established its role as an industry liaison group. Projects carried out for the Queensland Fish Management Authority included an assessment of the central Queensland scallop industry, the development of a marketing statistics return and a programme explaining the management process of fishing closures for industry members.

Resource management programmes introduced to stabilise fishing effort are having a positive effect, and a return of financial confidence in the industry is noted. The implementation of the Torres Strait treaty rationalised fishing activity in the prawn, rock lobster, mackerel and pearl fisheries in that area.

Aquaculture

Interest in aquaculture escalated with more than 1500 enquiries received at the Department's Southern Fisheries Research Centre at Deception Bay. Main interest related to farming marron, a freshwater crayfish native to Western Australia, and to prawns and barramundi. Research work on prawn farming in south Queensland will centre on the aquaculture centre being established on Bribie Island.

Researchers at the Northern Fisheries Research Centre, Cairns, and the Walkamin Research Station, near Mareeba, successfully raised barramundi fingerlings, using eggs taken from breeding fish captured in the wild. Work is continuing to encourage captive fish to spawn in tanks. This is the key to commercial fingerling production.

Mr Frank Fraser (left), a senior vice-president at Atomic Energy of Canada Limited, discusses the industrial irradiation of food products with Dr G. I. Alexander, director-general of the Queensland Department of Primary Industries. This alternative method of pest control offers Queensland primary producers the exciting opportunity to expand market outlets both in Australia and overseas.

New crop varieties

Increased emphasis was placed on plant-improvement programmes, and new varieties of maize, soybean, tomato, apple and wheat were developed. These improved varieties offer growers considerable production advantages.

The wheat variety named Vasco, which is resistant to a new race of stemrust, was developed at the Queensland Wheat Research Institute, Toowoomba. This is the ninth variety to be developed at the Institute since it was established in 1962.

Training of overseas staff

The Department's overseas development section was involved in three major training courses, two of which were held in Queensland and one in Malaysia. A 3-month dairy technology course, funded by the Australian Development Assistance Bureau (ADAB), began in April. It attracted 17 participants from India, Pakistan, Nepal, Bangladesh, Bhutan and Sri Lanka. As part of their training, course members had to plan a project that would benefit their local dairy industries.

In June, 20 participants from Sudan and Egypt began a 13-week course on the post-harvest handling of grain, including warehouse management and marketing. The Department provided the technical input for this course, held in association with ADAB and a private agricultural consultancy firm. Departmental officers also helped conduct a 3-week Food and Agriculture Organisation (FAO) course, on high rainfall tropical pasture production, in Malaysia. Twenty participants from five Asian countries attended the course held at the University of Pertanian Malaysia, Kuala Lumpur.

The Department, in addition to group-training courses, also conducted specialised training programmes for 25 persons from 12 different countries. Among the subjects covered were tropical tree fruit production, pasture seed technology, fisheries research, beef cattle husbandry, control of tick fevers in cattle and fumigation techniques for quarantine purposes.

The Department organised a number of visits for senior executives from overseas countries. Among those from Thailand were Princess Sirindhorn and the Deputy Minister for Agriculture and Co-operatives, the Hon. Borom Tantchein. Ten delegations from China studied plant-breeding work and the administration and marketing of wool, wheat and sugar.

Overseas consultancies

During the year Departmental officers undertook short-term consultancies in Papua New Guinea, Indonesia, Taiwan, Singapore, Malaysia, China, Thailand and India to help solve agricultural production problems in these countries.

Some of this consultancy work was carried out in association with the Australian Centre for International Agricultural Research (ACIAR). This is a Commonwealth-funded body with the role of marshalling Australian agricultural research capacity to undertake collaborative research projects in developing countries.

This department is involved in seven ACIAR projects with research funds totalling $3.3m. These include post-harvest treatment of mangoes in Thailand and Malaysia, coconut crab biology in Vanuatu and developing vaccines for tick-borne diseases of cattle in Sri Lanka.

Special employment schemes

The National Employment Strategy for Aboriginals (NESA) programme, sponsored and funded through the Commonwealth Department of Employment and Industrial Relations, provides for employing and training people of Aboriginal and Torres Strait descent. In 1984-85 the Department again participated in the scheme, and 38 trainees were employed in the Department under NESA to gain personal skills and work experience.

A total of 73 people were employed in projects totalling more than $1.07m under the Commonwealth Government's Community Employment Programme.

The Department's research stations branch received $660,000 for nine projects, the largest of which was for construction work on a pilot prawn hatchery on Bribie Island. Another project enabled the branch to upgrade many of the gardens associated with government buildings in Brisbane.

G. I. Alexander
Director-General

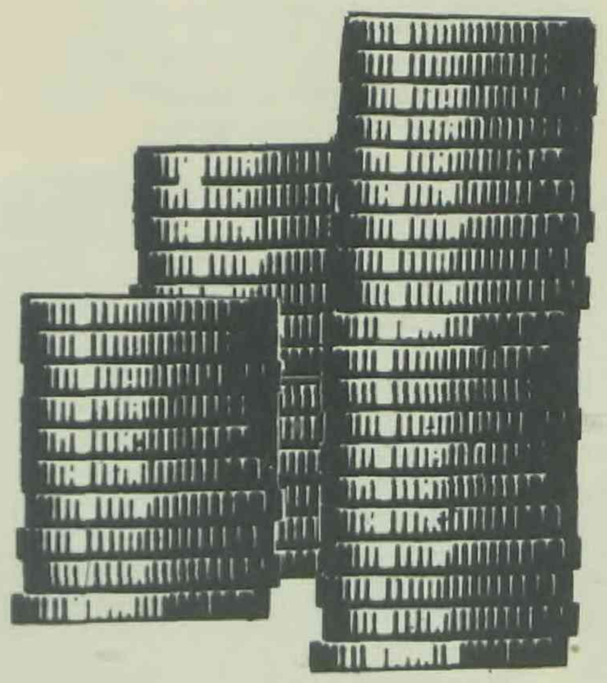
Participants from the Philippines helped DPI dairy officers adapt cream-whipping equipment for instant ice-cream manufacture, as part of an international training course in dairy technology held in Queensland in 1984. The course was organised by the DPI and sponsored by the Australian Development Assistance Bureau.

FINANCE

Following its recent computerisation, the Department's accounting system expanded to include sundry ledgers and the motor vehicle fleet. This system provides a major and material benefit to the management of the Department of Primary Industries.

Improved seasonal conditions resulted in greatly reduced payments under the joint Commonwealth/State Disaster Assistance Scheme. Assistance payments totalled $3,177,874, a reduction of $15,295,632 on the previous year's figure.

DPI expenditure from the various funds is shown below.



CONSOLIDATED REVENUE FUND

	1983-84 $	1984-85 $
Payments authorised by special Acts		
Grant in aid of the Banana Industry Fund	129 910	171 612
Department of Primary Industries		
Salaries	51 348 455	54 467 630
Contingencies	35 166 411	43 969 559
Total	**86 644 776**	**98 608 801**

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

	1983-84 $	1984-85 $
Eradication	9 800 000	10 800 000
Compensation payments	2 100 000	8 100 000
Additional assistance	2 400 000	160 000
Total	**14 300 000**	**19 060 000**

TRUST AND SPECIAL FUNDS

	1983-84 $	1984-85 $
Department of Primary Industries Special Standing Fund	24 664 459*	10 039 368†
Banana Industry Fund	293 161	336 004
Commonwealth Poultry Industry Assistance Fund	3 232 942	2 937 241
Commonwealth Quarantine and Export Inspections Fund	3 723 122	4 407 116
Commonwealth Rural Industry Grants Fund	2 692 077	3 033 103
Fisheries Research Fund	362 584	286 172
Meat Inspection Account	3 832 800	3 766 982
Poultry Industry Fund	756 421	833 438
Stock Disease Compensation and Stock Improvement Fund	32 596	33 034
Sugar Cane Prices Fund	1 888 076	2 186 181
Swine Compensation Fund	14 900	3 033
Total	**41 493 138**	**27 861 672**

* Includes $18,473,506 on account of Disaster Assistance Scheme and $860,903 on account of the Queensland Fish Board.

† Includes $3,177,874 on account of Disaster Assistance Scheme and $868,646 on account of the Queensland Fish Board.

LOAN FUND

Expenditure of $409,999 was incurred through the Loan Fund to 30 June 1985.

PRIMARY INDUSTRIES OVERVIEW

Rural production values

The preliminary gross value of rural production in Queensland in 1984-85 was $3058m, about 1% lower than in 1983-84. This slight decline can be attributed mainly to a fall to more normal values for cereal grains, partially offset by an increase in the value of the wool industry.

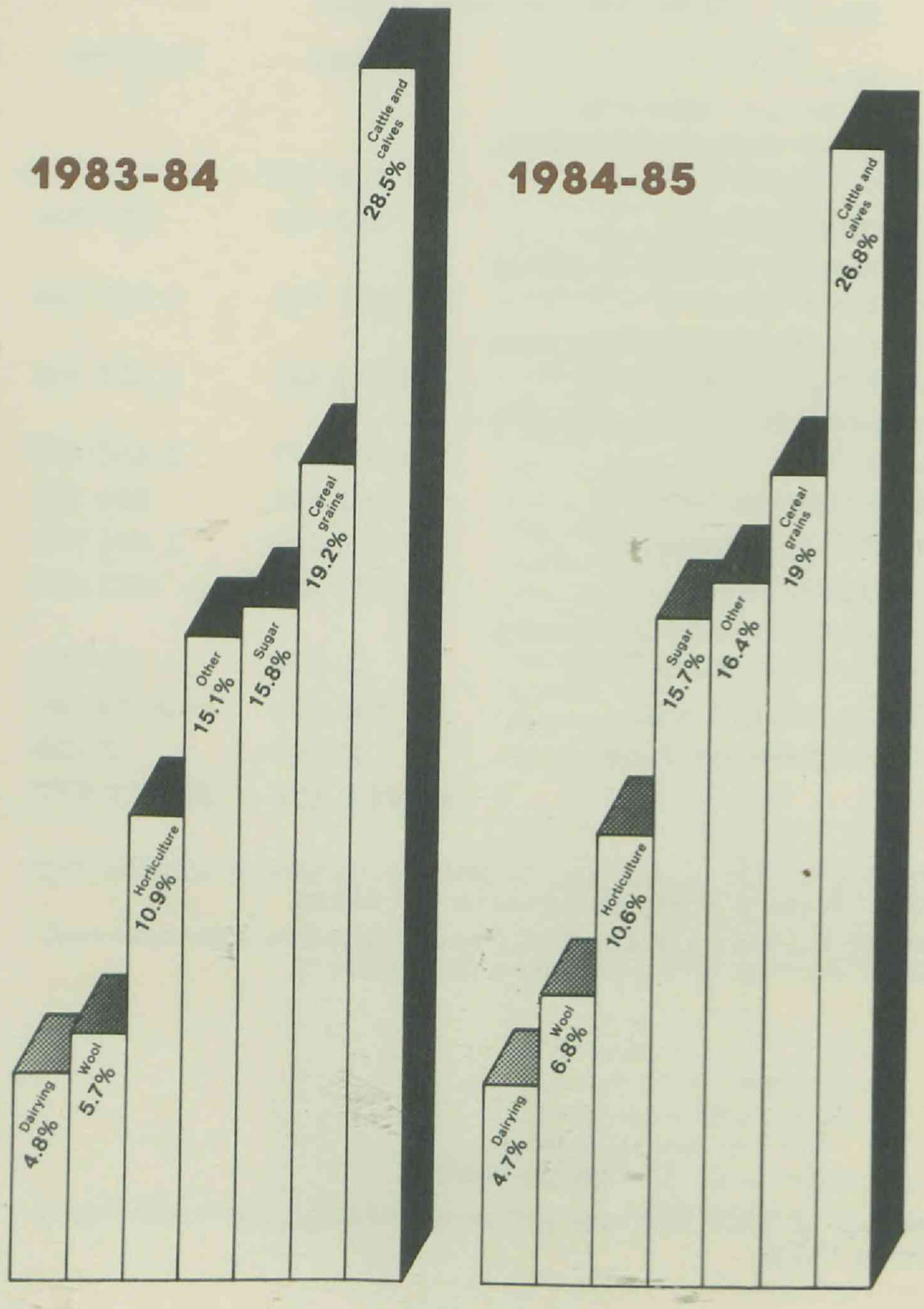
Livestock slaughterings (and other disposals) were valued at $985m, down 0.9% on the 1983-84 figure. The value of cattle and calf slaughterings declined by 3% to $819m.

Poultry slaughterings were put at $58.9m and pig slaughterings at $91.7m, increases of 14% and 12% respectively.

The value of wool increased dramatically from $184m in 1983-84 to $208m in 1984-85.

Horticultural production was valued at $324m, a 2% decrease.

The value of cereal grains was expected to fall to $581m, 7% less than the previous year. The largest declines were in wheat (down 8% to $288m) and grain sorghum (down 22% to $143m). Reduced production and market pressure on prices caused the declines.



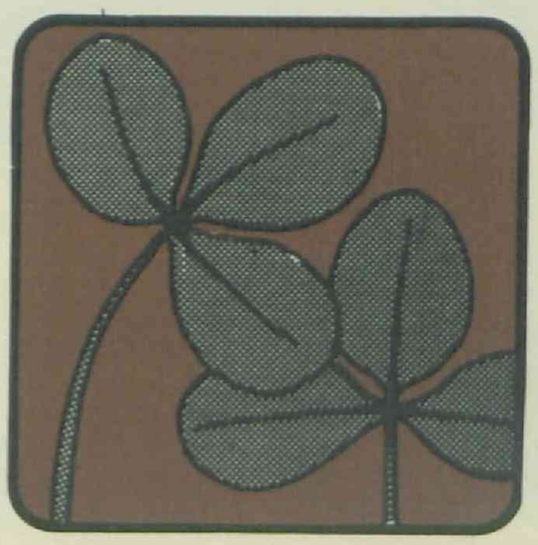
Pasture and fodder crops

After a dry 1984 autumn, prospects for the 1984-85 season were enhanced when the State received relieving rains during July and August. While herbage growth and feed quality improved in most areas as a result of the winter falls, dry to drought conditions still prevailed in the Lower Burdekin/Bowen and Far Northern districts.

During spring the Lower Burdekin/Bowen region benefited from useful rains. However, these falls were patchy and conditions throughout the district varied considerably. The Far North remained in urgent need of rain. Overall, except for the Far North, which was badly off for quality feed, and the Lower Burdekin/Bowen region, which carried little ground cover, the State enjoyed an above-average spring.

Summer was dry, with only variable and patchy rains. The high temperatures compounded problems created by low sub-soil moisture levels, causing a rapid drying-off of pastures, particularlyin the western sector. The State generally was in urgent need of good soaking rains to avert the onset of a widespread drought.

Isolated falls of rain occurred during autumn 1985, but few registrations were of any consequence. After the well-below-average autumn and summer rains, drought tightened its grip over the central inland, ranging from the mid north-west to the mid southern border region. With practically no agistment left in the inland areas, cattle were moved in mass to coastal areas where many were sold.



The beef industry

For the first time since 1978, Queensland's beef herd increased as producers responded to more favourable seasonal conditions, better prices and a much improved outlook to rebuild their herds. At March 1985, the beef herd was estimated at 9.228m head, 5% more than for the same time last year.

This trend was reflected in higher cattle prices during the year as both graziers and processors competed strongly for the limited supplies of available stock. At Cannon Hill the annual average price of steers (251 to 300 kg) increased by 12% to 171c/kg dressed weight, while the price of cows (201 to 250 kg) increased 11% to 154c/kg. The Queensland Cattle Market Index (Base 1981=100) averaged 134 compared with 121 in 1983-84.

Production was also affected by herd rebuilding and fell 8% on last year's level. This resulted in a 2.5% decrease in the gross value of production during the year to an estimated $819m.

Beef and veal exports were also below last year's levels due to reduced supplies and weaker United States demand for imported beef as a result of increased domestic supplies. However, returns received by exporters for cow beef to the USA reached record high levels during the year as a result of the sharp depreciation of the $A relative to the US$. The FAS price for imported Australian boneless cow beef during the year averaged 229c/kg compared with 215c/kg the previous year and reached a record high of 285c/kg in March.

Much progress was made during the year with electronic marketing. In Queensland, several computerised auction sales of cattle by description were successfully trialled, while, under the auspices of the Australian Meat and Livestock Corporation, a national Computer Aided Livestock Marketing System (CALM) was being developed and was expected to be operating by March 1986.

The wool industry

The State's sheep flock continued to expand with sheep numbers estimated at 14.04m head at March 1985, 8% more than last year. As a result, wool production increased from 65.6m kg to an estimated 67.3m kg in 1984-85. The gross value of wool production for 1984-85 increased 13% to $208.6m due to higher production but mainly higher wool prices during the year.

The floor price for the 1984-85 wool season was set at 470c/kg clear, unchanged from last year.

The 1984-85 wool selling began slowly with larger offerings, subdued demand and heavy intervention buying by the Australian Wool Corporation.The market indicator averaged 501c for the first half of the season and Corporation stocks reached a seasonal peak of 1.6m bales in November. However, the market improved dramatically in the second half of the wool-selling season. The market indicator rose sharply to a record 586c at the start of May. Coinciding with the indicator rise, Corporation wool stocks declined steadily to 1.05m bales at the end of May 1985.

The market improvement was mainly in response to a general improvement in the demand for wool, helped by a sharp decline in the value of the $A, in addition to higher trade clearances normally evident in the second half of the season.

The sheep meat industry

Sheep and lamb slaughterings for 1984-85 were expected to be about 1.1m, 13% down on last year. This was reflected in a decline in the gross value of production from $20.1m to an estimated $15.4m.

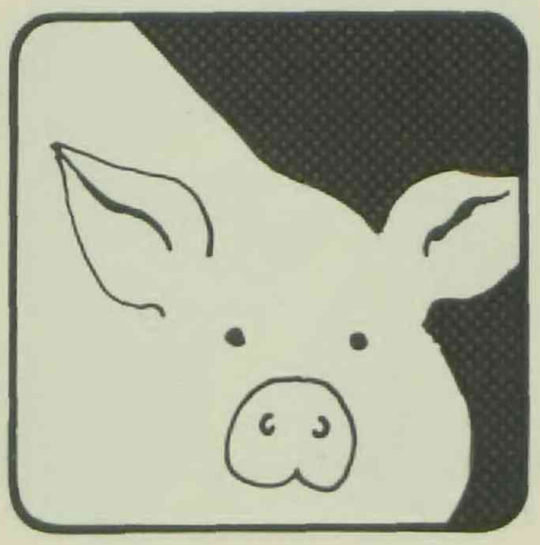
Prices in the sheepmeat industry were relatively depressed in 1984-85, despite a buoyant start to the season that saw low supplies of new season lambs. At Cannon Hill, Score 4 lambs sold to 161c/kg in August 1984 then fell to 121c/kg in December 1984. Dry pastoral conditions saw large turnouts of plain lambs and lower quality sheep. This exerted a downward pressure on the sheepmeat market.

Factors affecting Australia's export market for mutton were increased sheepmeat production in New Zealand; reduction in purchases by Japan; introduction of a sheepmeat regime in the EEC that increased production and lowered prices, particularly in the United Kingdom; and difficult trading conditions in Iran. These factors were expected to continue to depress mutton prices in Australia.

The pig industry

In 1984-85 pig slaughtering was expected to decrease by 0.5% to about 932 000 head.

Current trends indicated resumed expansion in the industry due to improved producer confidence. Pig prices, although experiencing a decline, were about 15c above the price available at the same time in the previous year. With feed requirements generally in good supply, feed costs were decreasing. Preliminary estimates placed Queensland sow numbers at about 60 000, 14% fewer than the previous year's 69 800 head.



The poultry meat industry

Slaughterings in 1984-85 were forecast to increase by 7% on 1983-84 levels to about 37.5m head and production by 7.4% to 44 600 t. As with previous years, growth-rate improvements and changes in market requirements resulted in a decline in the average age of meat chickens at slaughter.

After the regular 6-monthly review of indexed production costs, the Chicken Meat Industry Committee set the amount paid by processors to contracted growers for rearing chickens at 30.4c/bird for July to December 1984 and at the same rate for January to June 1985. The average growing fee for the 1984-85 season of 30.4c showed an increase of 4.5% on the average payment of 29.08c in 1983-84.

The egg industry

Queensland egg production for 1984-85 was estimated at about 33m dozen compared with more than 36m dozen in the previous year.

The production drop reflected severe quota reductions in 1983-84, enabling the industry to reduce substantially surplus production levels.

South Queensland Egg Marketing Board egg sales were estimated to be more than 3% greater than the previous year, but Central Queensland Egg Marketing Board sales were likely to be below 1983-84 levels.

The reorganisation of egg grades enabled the industry to satisfy the market demand for the various grade sizes more effectively, while the new cartons introduced last year enhanced product protection and presentation.

The dairy industry

Queensland wholemilk production for 1984-85 was estimated at about 623m L, 0.9% below the previous year's. The small decline reflected mainly the continuation of favourable seasonal conditions in most areas. Sales of market milk, which includes white, flavoured, UHT and low-fat milk, were expected to increase by 0.7% to about 278m L. Butter production for 1984-85 declined by 17%, wholemilk powder by 40% and leviable cheese by 5%. Overall manufacturing declined by 2.3%.

Average farm-gate returns to Queensland dairy farmers for all wholemilk supplied to factories remained depressed at 22.6c/L. The average farm-gate price for market milk was about 37c/L and for manufacturing milk, 11.4c/L.

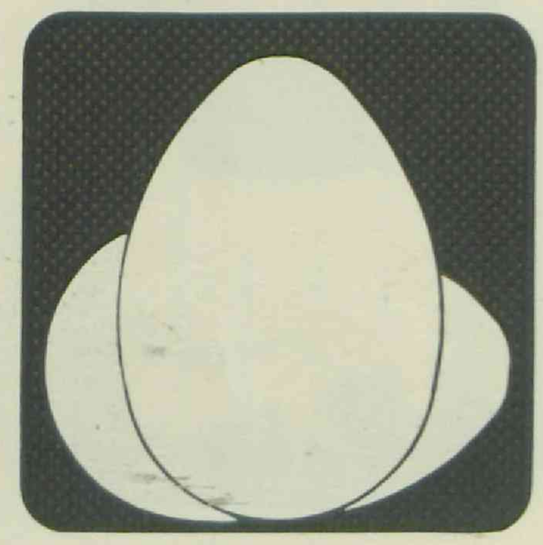
On the export market, prescribed dairy products were once again oversupplied, and prices remained depressed. Pressure to sell stocks forced some overseas countries to sell large quantities of butter and milk powders below the agreed GATT minimum-price provisions.

During 1984-85 the Commonwealth Government sought to introduce a new dairy marketing scheme. However, Parliament did not pass the new legislation.

The new scheme involved phasing out existing support/stabilisation arrangements for prescribed dairy products, altering underwriting provisions, and repealing unproclaimed Commonwealth legislation relating to interstate trade in market milk. The proposed new support/stabilisation arrangements for dairy products would have involved an all-milk levy and an interim product levy on butter and cheese to support export returns of all dairy products to 130% of average export returns in the current and previous 2 years.

Deer farming industry

Interest in deer farming continued to heighten. The local industry is supplying venison to an expanding restaurant trade, and herd build-up will help to ensure regular supply to these outlets.



The fishing industry

Apart from good catches in the Torres Strait and on the coastal regions north of Cairns in the second half of the year, production in the State's major fisheries was again mixed, with catches generally below industry expectations.

Some improvement in export returns was achieved through the depreciation of the $A. However, rising costs, particularly for fuel, continued to squeeze fishermen's margins. Similarly, domestic traders' margins also came under pressure as competiton increased for the apparent decline in availability of wet product.

A feature of the year was the implementation of trawl closures in State waters between Cape York and Bowen. These closures were designed to protect the fishery from over-exploitation and to allow the juvenile source to reach commercial size before capture. The DPI and the Queensland Fish Management Authority will assess carefully the results of the closure before recommending on future closures.

The sugar industry

Queensland's 1984 sugar crush was completed on 13 December when the last of the State's 23.91m t of cane was crushed. This is a 5% increase on the 22.72m t crush in 1983. The sugar content of the crop improved on the 1983 level, with the average c.c.s. reaching 13.72 compared with 13.01 in 1983.

Except in central districts, this improvement was a result of a favourable wet season, followed by a generally good growing period and, with a few exceptions, excellent harvesting conditions.

About 3.34m t of sugar was produced from the 1984 crop. On average, the tonnage of cane required to make one tonne 94 n.t. sugar in 1984 was 7.14. In 1983, the ratio of 7.54 t of cane to 1 t of sugar produced 3.17m t of sugar.

The world sugar market showed some slight sign of improvement, but prices were still very depressed. From an average quote of $A196.10/t in January 1984, prices fell significantly to record an average of $A123.72/t in December. For 1984 the average market price was $A156.40/t compared with $A234.43/t in 1983. In 1985 the price had improved to record an average of $A159.87/t in March. However, after that, prices fell and, in early May, had fallen to pound sterling 68.50/t ($A120.41/t), one of the lowest prices for years.

The new International Sugar Agreement was fully ratified and enforced on 4 April 1985. Insufficient returns of ratification documents from member countries by the 1 January deadline led to the agreement being enforced provisionally. The agreement, which does not include any economic clauses, is largely an administrative pact that will remain in force for 2 years, but can be extended on a year-to-year basis.

The wheat industry

Queensland produced about 1.5m t of wheat in 1984-85 compared with 1.9m t in 1983-84. The national crop was estimated at 17.5m t, the second biggest crop received, and quality was excellent with relatively little downgrading.

Australian exports were expected to reach a record 15m t compared with 14m t in 1983-84.

The guaranteed minimum price was set at $145.35/t for ASW wheat compared with $150/t last year. Net returns to growers for ASW wheat were again likely to be below $120/t for the year.

The world market remained intensely competitive; however, the Australian Wheat Board's closing stocks (although high at about 5m t) were expected to be about 30% less than last year.

Australia-wide legislation was introduced in late 1984 for a new wheat-marketing scheme. This 5-year scheme introduces a payments system that better reflects market values and a method for direct stockfeed sales, and allows expanded futures trading operations by the Board.

The barley industry

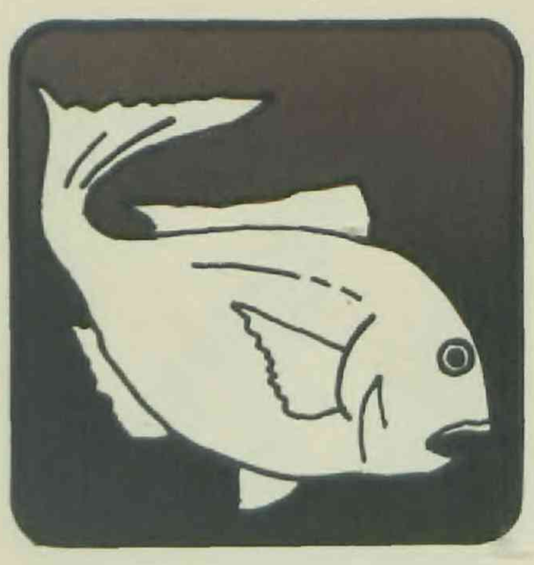
Favourable growing conditions resulted in a record barley harvest in 1984-85. Total Queensland production reached 755 000 t compared with 542 000 t in 1983-84. Average yields in 1984-85 were 1.99 t/ha compared with 1.85 t/ha the previous season.

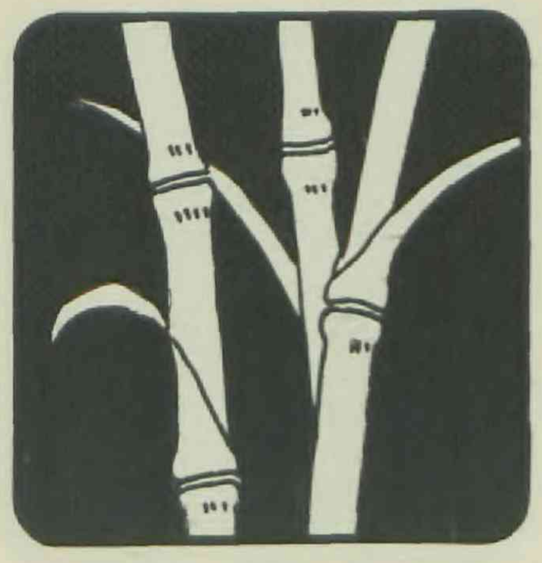
Gross value of production was estimated at $102.5m compared with $86m in 1983-84. Although production increased by about 40%, a similar increase in GVP was not achieved due to lower domestic and export prices.

The Barley Marketing Board received some 663 000 t compared with 446 000 t in 1983-84. Some 103 000 t were sold on the domestic market as malting barley and feed grain, the remainder being exported to Japan, Europe and Saudi Arabia.

A first advance of $88/t was paid on all deliveries to the Board compared with $112/t for the previous pool.

The Board again offered three payment systems during 1984-85. About 35% of producers elected to accept the discounted cash payment in lieu of the normal pool payments spread over 12 to 15 months. Cash payments ranged from $90.69/t for feed grade to $97.15/t for malting grade. About 23% of growers delivering to the pool elected to cash out the net pool tonnage. These cash-out payments ranged from $3.82/t for feed grade up to $10.50/t for malting grade. The Board again expected to be able to finalise this year's pool within 12 months.





The grain sorghum industry

An estimated 522 000 ha of grain sorghum was planted in 1984-85, about 5% less than in 1983-84. Production was forecast at 1m t, about 28% less than the 1.39m t produced in 1983-84. Dry conditions later in the season resulted in the final plantings and yields in southern Queensland and on the Central Highlands being significantly lower than expected earlier in the season.

The favourable spring planting conditions in most of central Queensland resulted in the CQ Grain Sorghum Marketing Board again operating a separate pool for early sorghum. A record 100 786 t was received into this pool. Average returns to growers from both the 1984-85 pools were expected to be slightly higher than the 1983-84 average pool price.

The maize industry

Maize production in 1984-85 was expected to total 210 000 t, about 20% higher than in 1983-84. While the area planted was estimated at 92 500 ha, about 68% greater than last year, crops were adversely affected by hot, dry conditions in most areas except north Queensland.

On a regional basis, production was estimated at: 30 000 t from north Queensland (23 500 t in 1983-84); 29 000 t from the Central Highlands (3000 t in 1983-84); 28 000 t from the Dalby area (11 500 t in 1983-84); and 123 000 t from other areas (137 000 t in 1983-84).

The oilseed industry

The area planted to sunflowerseed in Queensland continued to expand, with total plantings increasing from the relatively low level of 119 715 ha in 1982-83 to 141 254 ha in 1983-84 and rising further to 207 000 ha in 1984-85.

Sunflowerseed production was expected to show a commensurate increase, rising to 140 000 t (99 559 t in 1983-84 and 72 032 t in 1982-83).

While production increased substantially this season, dry weather, particularly in the major growing areas of southern Queensland, reduced overall yield prospects.

In 1985-86, growers were likely to continue to expand sunflowerseed plantings, thus raising the potential for greater production next season if weather conditions are favourable.

Sunflowerseed oil-price movements generally paralleled the upward trend of those of other vegetable oils and ranged from $340 to $352/t, compared with the levels of between $280 and $300/t in 1983-84.

Soybean plantings recovered to 34 000 ha in 1984-85 from the relatively low level of 30 318 ha a year earlier, and production increased to 62 000 t from 59 566 t in 1983-84. Average yields/hectare in the major producing areas also improved, despite dry weather.

Prices of soybean oil averaged between $297 and $312/t, moderately higher than the $260/t average in 1983-84.

In contrast, plantings of safflowerseed declined, totalling only 20 000 ha, compared with 29 482 ha in 1983-84, and production of safflowerseed fell to 17 000 t, nearly 4000 t less than a year earlier.

Linseed production for 1984-85 was unchanged from the previous season's disastrously low level of 212 t from an estimated area of about 250 ha.

The peanut industry

Peanut production in 1984-85 was estimated at 43 000 t nut-in-shell from 31 791 ha compared with 1983-84 production of 46 144 t from 31 850 ha. Weather stress reduced earlier-season yield estimates and also affected peanut quality in some areas.

The Peanut Marketing Board announced a first advance for the 1985 pool of 40c/kg for Virginia Bunch and Red Spanish varieties and 35c/kg for the White Spanish variety. This was equivalent to the 1984 pool first advance. The Board expected to finalise the 1984 pool in July 1985, with indications of a final pay of 7 to 8c/kg plus individual grower upgrades (average 6c/kg). This meant that the average return for the 1984 pool should be more than of 60c/kg, with payments of up to 70c/kg for growers with top-quality peanuts.

The dispute in the industry between the Board and the 'independent' shellers and their respective grower-supports continued, although the Board resolved in May 1985 to seek discussions with the shellers on possible options for the industry's future marketing structure. The Board received about 80% of the 1984 harvest and expected to receive 75 to 80% of the 1985 crop.

Imports of peanuts were not expected to be significant in 1985 due to the relative strength of the US$. The Board was actively seeking export markets for the quality Queensland product in such markets as New Zealand, Japan and the United Kingdom.

The navy bean industry

On balance, 1984 was a good year for the navy bean industry. Although excessive rain delayed planting in January, about 6000 ha were finally sown to the crop. Dry conditions adversely affected the development of the main summer-sown crops during March, but yields at harvest were well above average. Just over 6000 t were produced.

The Board paid a first advance of 45c/kg on canning-grade beans and 65c/kg on approved seed. A residual payment of at least 25c was expected. A 'cash-out' option based on 19c/kg was also offered on canning-grade beans at various times during the season.

Plantings for 1985 were estimated at 8500 ha. Although the yield potential for summer crops was reduced in a number of districts because of dry conditions, the overall yield for the State was forecast at well above average. In total, up to 7500 t could be produced. The Navy Bean Marketing Board announced a first-advance payment of 45c/kg for canning in grade beans from this crop.

The rice industry

Production from the twc 1984-85 rice harvests was expected to reach about 20 800 t, marginally below 1983-84's. The summer rice harvest was 10 300 t, with the Burdekin district supplying 7100 t and Mareeba the balance.

The 1985 winter harvest was expected to produce about 10 500 t, comprisinga record 7100 t from the Mareeba district and about 3200 t from the Burdekin, with about 200 t from the Ingham district.

Returns to growers have declined significantly to $165 to $170/t from about $200/t 3 years ago. Growers have had to accept lower prices to remain competitive with imported Asian rice. This situation has eased recently with the decline in value of the $A.

The cotton industry

Production of ginned lint cotton in Queensland during the 1984-85 season set a 10th consecutive record, possibly reaching and, perhaps even exceeding, 190 000 bales, nearly 40 000 bales more than the 1983-84 output.

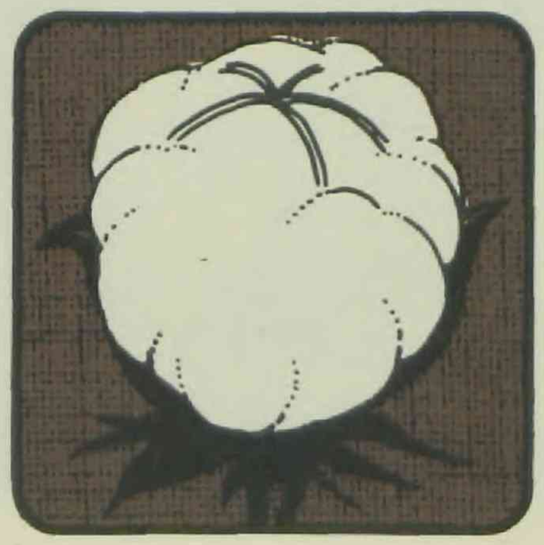
Improved yield prospects and continued expansion of cotton plantings, particularly an unprecedented increase in the area sown to rain-grown cotton, accounted for the record production.

The greatest proportionate increase in cotton production was likely to occur on the Darling Downs mainly because of the increasing use of on-farm 'ring-tank' water facilities. The profitability of cotton growing compared to alternative crops at planting time has resulted in spectacular increases for other cotton-growing areas of the State.

Hail-stone damage and other weather-related losses again curtailed the production potential of some major cotton-growing areas. Consequently, the earlier anticipated crop estimate of at least 200 000 bales of cotton was not realised.

In line with the general uptrend in Australian cotton production, which now exceeds 1m bales, the cotton crop in Queensland was projected to expand. Production of ginned lint cotton for the coming season was conservatively forecast at more than 200 000 bales.

The highlight of the current season's crop was the production of good to excellent grade and quality cotton, which had already attracted a keen buying interest from Asian countries.



On the export front, the Cotton Marketing Board experienced a difficult marketing year, reflecting a world cotton-supply surplus of nearly 15m bales and consequent depressed prices on world markets.

Nevertheless, the Board maintained its reputation as a reliable supplier of quality cotton and, apart from traditional marketing in Asian countries, notably Japan, Taiwan and the Republic of Korea, it expanded its exports to Europe, thus assuring sales of the 180 000 bales for export availability this season.

The fruit and vegetable industries

Over-supply of many crops characterised the horticultural industries in 1984-85 due largely to good growing conditions in most areas. The heavy supply in many industries resulted in considerably lower prices for many commodities. The estimated gross value of production for horticultural crops was about $325m in 1984-85 compared with $332m in 1983-84.

The value of production of Queensland vegetable industries (including tomatoes) was estimated at $170m, down $26m on 1983-84. Fruit production in 1984-85 was worth $154m, up $19m.

The ginger industry

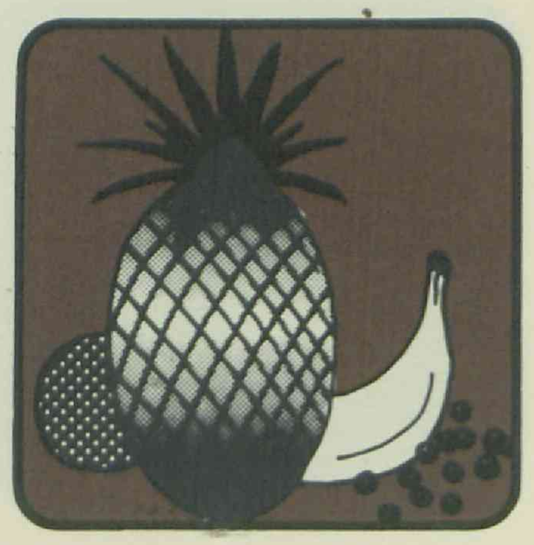
Intake by the Buderim Ginger Growers' Co-operative Association Limited in the 1984 season was 2644 t, similar to the previous season's 2334 t. The Co-operative anticipated receiving up to 3500 t in the 1985 season as it progressively overcame the overstocking problem in some lines. The industry was becoming increasingly interested in developing export markets for green ginger and an estimated 400 t could be exported from the 1984-85 crop.

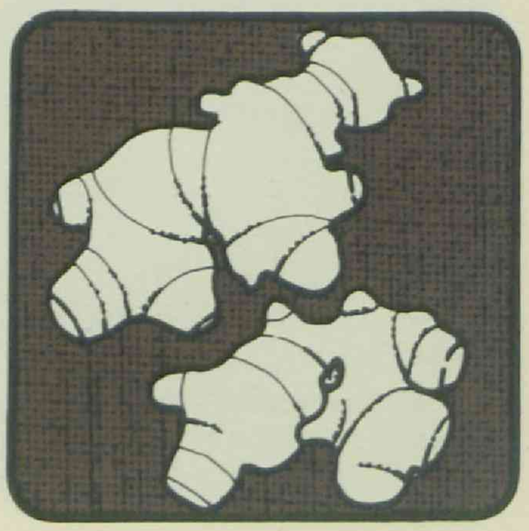
The tobacco industry

Tobacco sales to the end of May 1985 accounted for 73.9% of the 1985 State marketing quota of 7.46m kg at an average price of 518.5c/kg, 12.5 c/kg above the minimum average reserve price of 506 c/kg. The total value of tobacco-leaf production for the 1985 selling season was expected to be about $38m.

Growers were subjected to a 3.27% reduction in their call-up of tobacco for sale as a result of an Australian Tobacco Board decision to implement a shortsell of 450 000 kg for 1985, brought about because of consumption declines. Initially, 1985 quotas were set at 2.85% below 1984 allocations.

The tobacco industry continued to undergo significant restructuring through transfer of quota between regions. In particular, 390 000 kg of tobacco quota from New South Wales was transferred to north Queensland growers with the approval of Ministers in both States. Further quota was expected to move into Queensland in 1985, but at a reduced rate.





ANIMAL INDUSTRY HIGHLIGHTS

The meat industry

The DPI's veterinary public health branch, with the Livestock and Meat Authority of Queensland, actively promoted meat as a nutritious food. Late in the year, the Minister for Primary Industries, Mr Neil Turner, launched a beef-promotion film *Tough and Tender*. Changes were made in retail meat trading to permit meat sales over the front counter direct into the malls of air-conditioned shopping complexes.

Limits for pesticide residues in meat for both the local and export markets are set by legislation. About 5000 samples of fat from slaughter cattle throughout Queensland were monitored for residues of 23 pesticides.These analyses indicated a responsible use of these chemicals with a compliance rate of 99%.

The cattle industry

A major advisory activity was undertaken to make producers more aware of the need for reducing the age of cattle at slaughter. Other advisory programmes promoted carcass classification and sale by description. Some emphasis was given to programmes covering the use of adapted cattle and objective selection criteria, pasture improvement with stylo and para grasses, and management practices designed to reduce labour costs.

Schemes for the electronic marketing of cattle (including QUEST and NELCM) are available to Queensland's cattle producers. DPI beef cattle husbandry officers took part in major advisory programmes for producers on these schemes' operations and benefits. One of the advantages of these schemes over other selling methods is the minimising of animal handling and transport.

Investigation of the most efficient handling and transport of cattle, for both production and welfare aspects, has been a major DPI endeavour in recent years. To consolidate this work and that of other organisations, DPI officers organised a national workshop on cattle handling and transport facilities for people in the private and public sectors. Initiatives for research, extension and regulatory consideration were developed.

Staff conducted schools throughout the State to develop producers' live-animal assessment skills. These schools were to continue and promote carcass classification trading. About half the export abattoirs now offer price schedules, based on premiums and discounts for various carcass attributes, namely weight, fat, age and sex.

Maxwelton Special Area (MSA) was defined in December 1981 after a severe outbreak of cattle ticks in country normally regarded as tick free. The MSA originally involved 146 properties in movement restrictions.

Because of progress in tick eradication, the MSA was redefined as three smaller sub-areas: MSA (Julia Creek), MSA (Richmond) and MSA (Hughenden). As a result, in May 1985, 67 properties were released from movement restrictions, and further progress was expected by the end of 1985.

Botulism caused some severe cattle losses, exacerbated by the dry conditions, in phosphorus-deficient areas of the State. Because combined botulism types C and D vaccine was largely unprocurable, graziers were encouraged to vaccinate with the readily available monovalent type D vaccine. It gave excellent field protection.

A control programme, aimed at significantly reducing the genetic pool of Pompe's disease in Queensland stud Brahman cattle, was begun. The programme had the Brahman Breeders Association's strong support.

Widespread ephemeral-fever outbreaks occurred in cattle from 6 months to 2 years of age in the eastern coastal and sub-coastal areas. About 1% of affected cattle died. The vaccine developed by the University of Queensland Veterinary School to control this disease was expected to be registered and available during 1985. The DPI collaborated with the university in field efficacy testing of the vaccine.

Salmonella dublin, introduced to Mutdapilly Research Station near Ipswich by heifers originating from Victoria, was successfully eradicated from the station. The disease had also been detected on a limited number of commercial properties after introduction of cattle from Victoria. Of concern was an outbreak of *S. dublin* septicaemia in calves bought from a saleyard with no apparent link with Victorian cattle.

Stock poisoning

Aflatoxin, a mycotoxin produced by the fungus *Aspergillus flavus*, caused losses of pigs, cattle and ducklings. Fungus-infested grain is frequently associated with this intoxication as was the case in these outbreaks.

Copper is an essential dietary element for livestock. Its deficiency results in poor growth anaemia and neurological disturbances. However, it is also a toxic element. During the year deaths were recorded in: cattle that had accidental access to a copper salt; pigs that were fed a ration in which the added copper was in macro instead of microfine particles, thus precluding inadequate mixing; and goats that, when being treated to prevent deficiency, were injected with three times the recommended dose of copper glycinate.

***Brachiaria* sp. pastures** are grazed in north Queensland. In South-East Asia animals grazing Brachiaria pastures have developed liver necrosis, jaundice and photosensitisation. It has been claimed that this intoxication is due to the fungal toxin that causes facial eczema. Of 30 dairy cows grazing Brachiaria on the Atherton Tableland, 11 aborted and 7 of these died. Foetal pathology was consistent with the changes described in South-East Asia.

Blue-green algae poisoning caused the loss of 24 cattle on a Mitchell property. Thirty others were also affected out of a mob of 900 mixed cattle that had access to the dam containing the algae growth. The affected cattle suffered from severe liver damage and photosensitisation.

Amendments to the *Meat Industry Regulations* 1973 allowed partitions to be removed from around pre-wrapped-meat display areas in supermarket butcher shops.

Brucellosis and tuberculosis

In spring 1984, the Minister for Primary Industries, Mr Neil Turner, visited north and north-western Queensland and spoke with groups of graziers involved in bovine tuberculosis eradication programmes. Grazier members of the Pastoral Advisory Committee and senior DPI staff accompanied him.

Largely because of this visit, eradication policy was modified. Greater emphasis was placed on graziers developing disease-free groups of young breeding cattle and lesser emphasis on destocking, to achieve freedom from tuberculosis.

Three additional assistance measures were made available to graziers in remote areas. These included a $2/head testing subsidy where satisfactory musters are obtained and a 75% freight rebate for cattle bought for restocking and which travel more than 200 km. The interest rate for finance available to eligible graziers to erect capital improvements to help disease eradication was reduced from 8.5% to 4% for the first 5 years. There is a negotiable period up to 3 years for the deferral of interest and redemption, provided the full loan is repaid within the approved term. The loan limit was raised from $100,000 to $150,000. These revised terms applied retrospectively to the start of 1984-85.

Satisfactory progress was maintained in eradicating brucellosis and tuberculosis. All of Queensland was declared a provisionally free area for brucellosis on 30 June 1984; and the provisionally free area for tuberculosis was being extended to include the shires of Winton and Diamantina and the western parts of Barcoo, Bulloo, Longreach and Quilpie shires.

The brucellosis eradication campaign is the most complex animal-health programme undertaken in Australia. Progress in 1984-85 was very satisfactory. Of Queensland's breeding herds, 99.2% were classified as negative or free from brucellosis and a further 0.2% were provisionally clear.

Only 146 herds were classified as infected for tuberculosis and most were located in remote areas. The number of cattle with tubercular lesions at slaughter had been reduced from 2952 (0.15%) in 1975-76 to 763 (0.04%) in 1984-85.

Enzootic bovine leucosis

The enzootic bovine leucosis (EBL) accredited herd scheme progressed satisfactorily, with 21 dairy herds being granted accredited-free herd status and more than 1000 undergoing one or more herd tests. Nearly 600 of the State's 2500 dairy herds pursued testing towards accreditation. Test results showed a reduction, from 14.2% to 7.9%, in overall prevalence of reactors to the test.

The reagents used to test serum from cattle in the EBL accreditation scheme are now produced at the Animal Research Institute, Yeerongpilly. Before March 1985, the only reagents available came from the United States, at considerable cost. Using locally made products saves more than $1 in materials for each test.

The sheep industry

Extension officers in north-west Queensland ran a short-term (1 month) mass media campaign to test the effectiveness of this type of promotion for services provided by the DPI's sheep and wool branch. The result was a marked increase in enquiries from graziers compared with the number in previous months.

Five video films were produced to present the results of major research programmes. Subjects covered: the management of mulga and Mitchell grasslands, water medication, production and fortification of bush hay, and flock management to improve reproductive rates. Financial support for producing the films came from the Wool Research Trust Fund.

At the organisers' request, officers presented a display of sheep and wool branch research into blowfly control, water medication and methionine supplementation for wool production, at the annual field day at 'Boonoke' Merino Stud, Deniliquin, New South Wales. Subsequently, enquiries were received from commercial companies interested in collaborating in these research programmes.

The pig industry

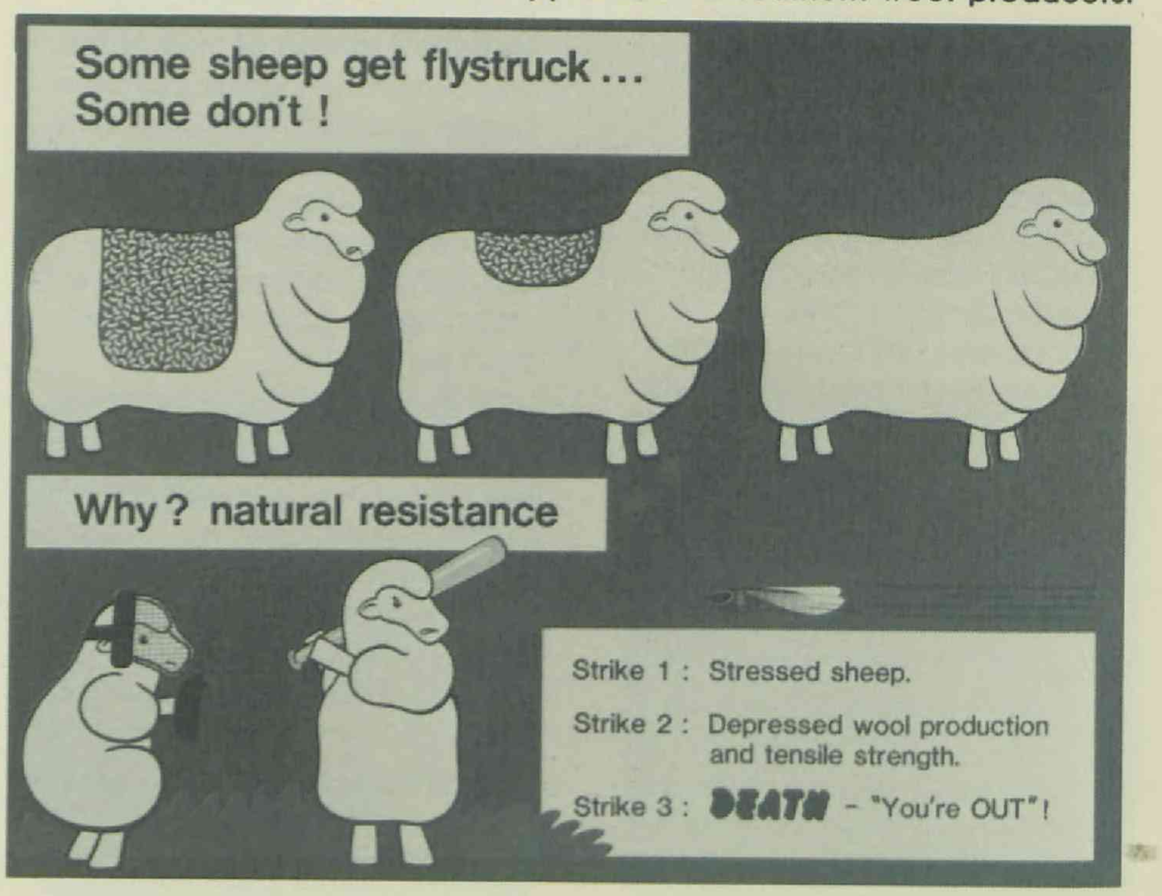
In 1984 the RNA's 'Producer of the Year' was judged within the pig industry. DPI staff were closely associated with the Queensland Pork Producers' Organisation in conducting and judging the competition, which had participants in every pig-raising district. The successful candidate was Mr K. Williamson, of Bundaberg.

A new trading initiative was introduced in 1985. Leading processors contracted with producers for regular supplies of pigs. Bonus incentives were offered for top-quality pigs.

A record 492 boars were processed at the Central Boar Performance Test Station at Rocklea. More pigs of Canadian origin in the Queensland herd improved the average performance at the station to 0.96 kg daily gain, 2.59 food conversion and 15.2 mm backfat.

Encephalomyocarditis virus infection of pigs was a disease of increasing importance. It causes sudden death, due to severe heart damage, usually in young pigs. Rodents carry and spread the disease, and the virus has been recovered from rat faeces in one of the recent outbreaks in Queensland. Mouse plagues have been associated with an increasing occurrence of this disease in southern states.

DPI research into blowfly control was one of the three research projects that the DPI's sheep and wool branch displayed at the annual "Boonoke" Merino Stud field day at Deniliquin, N.S.W., on 13 March 1985. Much of the DPI research results on blowfly control and wool production is applicable to southern wool producers.



The poultry industry

An economic survey of the egg industry in south-east Queensland was completed. The data will enable producers to calculate egg-production costs. The trend generally was for a greater adoption of record-keeping and a greater demand for economic advice.

Mild weather prevailed throughout the year resulting in few disease problems. After the significant economic losses from infectious laryngotracheitis (ILT) in 1983, many producers implemented a DPI-recommended vaccination programme in 1984 to control ILT.

A survey of pesticide residues in eggs produced in south-east Queensland was initiated, after detection of 0.05 mg/kg dieldrin in a sample of egg pulp. The maximum residue limit (MRL) is 0.1 mg/kg. A total of 206 samples from 174 producers had been analysed by year's end. Only five had exceeded the MRL. This situation was being corrected.

Psittacosis caused the death of parrots transported by car from Townsville to Mt Isa. The vehicle's driver was subsequently hospitalised with suspected psittacosis. Close association with such birds can result in this zoonosis.

Research in animal industries

Monoclonal antibodies were produced against viruses that cause enzootic bovine leucosis and ephemeral fever. These highly specific antibodies will be used to improve methods for identifying infected and non-infected cattle, and in feasibility studies on vaccines against the virus diseases.

Studies on the blood parasite *Babesia bovis*, the most common cause of bovine tick fever, showed that clones of the parasite differ in their pathogenic effect on cattle. Avirulent clones were identified for testing as an improved alternative to the current vaccine. A continuous-flow culture system was partially developed for producing vaccine *in vitro* rather than in cattle as at present.

Post-weaning diarrhoea in beef calves in some areas of Queensland may be due to coccidiosis, a disease caused by the intestinal parasite, *Eimeria zuernii*. Studies in north Queensland indicated that infections picked up by calves early in life remain inapparent until weaning. The stress of weaning apparently allows parasite numbers to build up in the gut wall, and clinical disease can result. Methods for control of the condition were being investigated.

Many field trials have been conducted to test the effects of growth promotants coming onto the market. These trials continued with newer products and assessments were made on the effect of long-term use of these products. Indications were that, in terms of liveweight advantage, use during the final fattening season was as good as extended use.

Recent research demonstrated the improvement to the nutritive value of bagasse with alkali treatment. In a drought situation, bagasse treated with alkali, urea and molasses maintained cattle. The results of this project were presented to the sugar industry, and one mill was preparing to treat bagasse during the coming crushing season. Treated bagasse will be fed in feedlot rations and/or sold as a drought feed.

Ewes between 100 and 130 days of gestation were run in a paddock from which most broad-leaf species had been removed by heavy grazing. They marked 82% of lambs compared with 51% marked by ewes grazing a spelled paddock during the same gestation period. This suggested that ingestion of broad-leaf plants may be reducing viability of new-born lambs.

Responses in wool growth of up to 37% were recorded when a methionine/bentonite supplement in the drinking water was offered to sheep.

Wool-growth rates of sheep consuming mulga improved by 21% after a nitrogen-phosphorus-sulphur supplement was provided.

In pathogenicity studies, a larval toxin appeared to be involved in initiating fever and toxaemia in sheep struck by *Lucilia cuprina*. Graded larval challenges showed that a strike with more than 1500 larvae could cause economic loss in wool production. Challenges of 3000 and 4000 *Lucilia* larvae depressed production by 15% and 30%.

An intradermal test using larval secretions as the antigen was developed to categorise sheep on their resistance to flystrike. It continued to be validated in the field.

In initial work on developing of a vaccine against *Lucilia cuprina*, antigens derived from larval organs stimulated antibody formation in rabbits. These antibodies depressed *in vitro* larval survival by about 40%.

At Charleville, *Lucilia cuprina* was shown to be able to overwinter in the soil as prepupal larvae for up to 8 weeks. This method of overwinter survival had not been previously demonstrated in Queensland.

Statistical analysis of research data was being improved by biometrical research projects on methods for estimating genetic parameters in sheep breeding and adjustment of cow weights for stage of pregnancy, and by a review of the storage, retrieval and analysis of data collected in large beef-cattle experiments.

The natural cashmere growth cycle of cashmere-bearing goats was defined. This allowed the optimum shearing time for different classes of goats to be identified so that maximum cashmere yields can be achieved.

DPI production-recording schemes help farmers identify factors affecting egg-production efficiency. Here a poultry section officer helps an egg producer with data recording in one of these schemes.

The development and testing of a vaccine against infectious coryza neared completion. With help from the Victorian Department of Agriculture, two field trials began on Victorian properties to test the efficacy of the vaccine. Killed *Haemophilus paragallinarum* (serotype C) mixed with aluminium hydroxide as an adjuvant was used in both trials. A natural challenge infection occurred on one property 10 weeks after vaccination, and a comparison of egg-production figures for vaccinated and non-vaccinated birds showed a highly favourable benefit-cost ration for use of the vaccine.

Husbandry research for the egg industry was directed at improving nutrition. Particular attention was paid to the inclusion of isoleucine, sunflower meal, calcium and weed seeds in diets at various levels to determine responses and effects. During the year a saleable publication *Nutrient Composition of Feedstuffs for Pigs and Poultry* was released.

Chicken-meat industry investigations concentrated on the prediction of slaughter weight, a survey on lighting intensities and the introduction of dry cup drinkers.

Growth rate and backfat responses of pigs to lysine and energy were assessed in a series of experiments involving limited and *ad libitum* feeding. Varying digestible energy intake affected growth rate and backfat independently of dietary lysine to energy ratio. The optimum ratio for 20 to 50 kg male and female pigs was 0.7:1. Above 50 kg liveweight, females needed no more than 0.5 g lysine/megajoule digestible energy, while for boars it was 0.6:1.

The chemical structure was determined of three major toxic components from the flowers of *Bryophyllum tuberosum* (Mother of Millions). This plant is responsible for frequent poisoning of cattle and sheep. The components were designated Bryotoxins A, B and C and were identified as new bufadienolides. Bryotoxin A, the most toxic member, has an approximate LD50 of 2 mg/kg in mice. For B and C the LD_{50} is about 10 mg/kg.

Fusarium toxins were identified in weather-damaged wheat from stores in southern Queensland. Six percent of samples examined showed the incidence of pink kernels, indicative of infestation by *Fusarium graminearum*.

Affected grain was predominantly general purpose (GP) grade. Deoxynivalenol and zearalenone, two common toxins produced by *Fusarium* moulds, were detected at concentrations of 0.01 to 0.4 mg/kg in a small proportion of wheat samples. In feeding experiments with pigs, a deoxynivalenol concentration of 2 mg/kg significantly decreased feed intake and growth rate. Lower concentrations were tolerated.

Brands

Computerisation of brands through the Computer Operated Brands Recording and Acquisition (COBRA) project continued. The horse and cattle brand, cattle earmark, pig tattoo brand and office moneybook systems were totally implemented and were being used on the COBRA system. Current owners of sheep brands and ear marks in 30 of the 37 sheep-brand districts had been included in the COBRA system and were being assessed. Entry of sheep-brand current-ownership data was scheduled for completion by August 1985.

Brands staff attended Farmfest in Toowoomba and the Eumundi field day to display the COBRA system and answer brands enquiries.

Quarantine

Access to overseas sources of animal genotypes was expanded further with the import of sheep and goats from north America, and pigs from the United Kingdom, and the development of protocols for the import of semen and embryos of various species from a number of countries. As the diagnostic capabilities of the high-security Australian National Animal Health Laboratory, near Geelong, are developed, access to genotypes of potential value to the Queensland beef industry will be possible to an increasing extent.

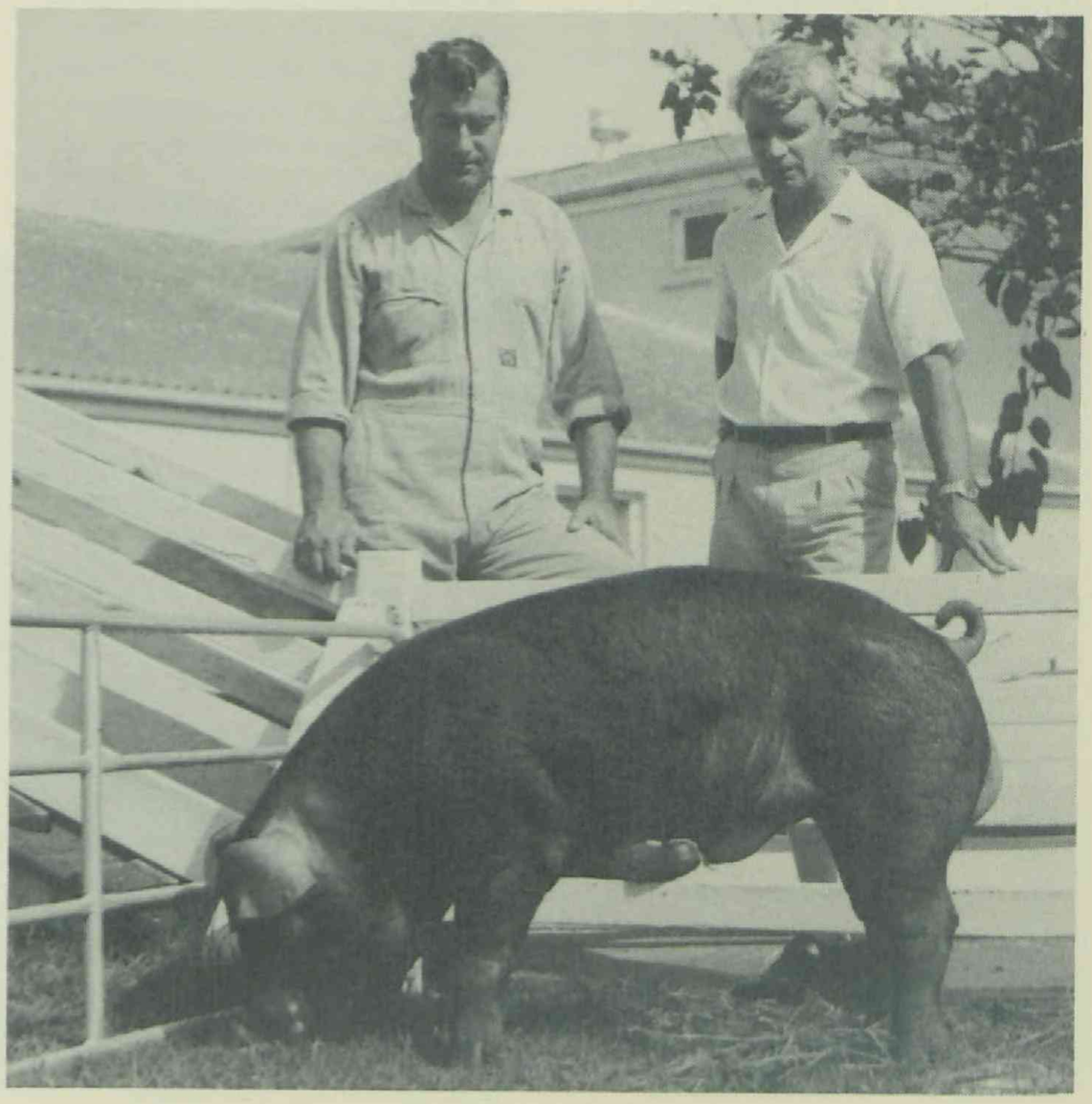
The signing of the Torres Strait Treaty poses new problems to maintenance of an effective quarantine barrier in this vital area. The enhanced risk of incursion of goods of quarantine interest from the Protected Zone demands a greater input of resources into several of the existing quarantine programmes in the region and increases the need for the proposed livestock-free buffer zone towards the top of Cape York Peninsula.

The Fort Lytton Quarantine Station, which had catered for the quarantine of imported cats and dogs for northern Australia for many years, was closed by the Commonwealth Government as an economy measure at the start of the year. North Australian importers now have to use the quarantine facility near Sydney.

Engineering effort

The DPI's main engineering effort was researching and developing energy-saving techniques to allow farmers to operate their enterprises at lower overheads. Increased input went into instrumentation of farming as well as research practices (in many instances by using electronics) so that operators are immediately aware of variations from acceptable standards.

Geneticists at the DPI's Pig Testing Station, Rocklea, evaluate the worth to the pig industry of local and imported sires.



DAIRY INDUSTRY HIGHLIGHTS

The Queensland dairy industry

Milk production in Queensland declined by about 0.8% to 617m L for the year ended 31 March, while dairy farm registrations dropped from 2655 to 2582. Australian milk production was expected to increase by about 1% to 6000m L in 1984-85.

Market milk prices remained unchanged in Queensland. However, a market-milk price increase, granted in March 1984, helped offset weakening prices for manufactured dairy products. The result was that the average net pay to Queensland producers for all milk for the year was 22.4/L compared with 22.3/L in the previous year.

The Australian dairy industry was characterised by uncertainty and difference of opinion about future national marketing arrangements. Agricultural Council on several occasions failed to agree on a marketing plan. Subsequently, the Commonwealth Government drew up a plan, but the Senate rejected the legislation.

Dairy factory activities

Queensland dairy factories invested $8.3m on improved building facilities and new processing and packaging equipment.

Dairy-product packaging was highlighted by the introduction of 2 L blow-moulded plastic milk bottles. Marked changes in consumer buying habits were already evident.

Intensive-training schools were conducted for dairy factory operatives and laboratory technicians from the dairy industry throughout the State. Topics included equipment innovation, process modifications and energy management.

The National Workshop on the Standardisation of the Australian Code of Practice for Dairy Factories was hosted by Queensland. The workshop, conducted under the auspices of the Standing Committee on Agriculture, was held in Brisbane in April. Thirty Australian government and industry representatives, and one New Zealand representative attended. Another 50 people participated in the technical sessions and trade display. The workshop was an important step in reviewing and updating the Code and gave inspecting officers from throughout Australia an opportunity to standardise inspection procedures.

International training courses

In 1984 DPI dairy officers conducted a 3-month dairy husbandry/technology course for 18 participants from the Philippines. In April 1985 a 3-month dairy technology course began for 15 participants from the Indian sub-continent countries. Participants obtain both educational and practical experience. The Australian Development Assistance Bureau sponsored both courses.

Two dairy officers went to the Philippines and assessed the application of knowledge that participants gained from the 1983 and 1984 courses. In addition, an officer travelled to the Indian sub-continent countries before the 1985 technology course to evaluate training needs and interview prospective course participants.

A blend of modern technology and simple, low-cost equipment had spectacular success in a practical project designed specifically for participants of the international training course in dairy technology. Cream-whipping equipment previously developed in Queensland was adapted for instant ice-cream manufacture. This innovation, which yields overrun of up to 400%, creates opportunities for small processors to employ advanced technology.

Dairy farm production

Minimum tillage techniques for establishing winter crops and pastures were the subject of on-farm projects. Minumum tillage involves removing most summer-growing plant material from the area through heavy grazing, slashing or chemical treatment, and then sowing directly into an unprepared seed-bed. The DPI sod-seeder, which can sow seed into unploughed ground, was widely used in these projects. Minimum tillage reduces soil erosion and decreases land-preparation costs.

The RNA Dairy Farm Management Competition was held in 1984 for the second time. The competition attracted 13 entrants from all dairying areas. Farms were judged on their total management strategy, including animal nutrition, pasture management and herd improvement. DPI officers again judged the competition.

Silage as a supplement in feeding systems continued to attract farmers' and officers' interest. In August, 200 people attended a National Silage Workshop in Armidale. Farmers and DPI officers attended a Brisbane seminar at which Dr R.H. Phipps, of the National Institute of Research in Dairying, Reading, England, presented a paper on 'Production, Conservation and Utilisation of Maize Silage for Milk Production'.

Dairy farmers from the Darling Downs and West Moreton, accompanied by DPI dairy officers, toured central Queensland and the Atherton Tableland to study feeding systems. Their particular interest was summer pasture management.

Many tours were made to the Mutdapilly Research Station and the Wacol A.B. Centre. Altogether, more than 300 dairy farmers took part in 29 intra-state tours. In addition, two farmer groups, accompanied by their district dairy officers, toured northern New South Wales; and members of a South Moreton discussion group toured Tasmania.

Financial information was analysed for more than 200 farmers. Dairy officers helped develop systems to record information in cash books, easily and accurately. Costs, particularly those associated with feed production, were regularly examined.

Mr John Pain (second left), the manager of Heat Transfer Pty Ltd, describes the 'spiroflo' principle of pasteurisation to participants at the market milk and cream pasteuriser school that the DPI conducted at Redcliffe in July 1984. The 'spiroflo' method transfers heat through a series of pipes to pasteurise dairy products.

Dairy goat investigations

Investigation of practices to minimise the seasonality of goat milk supply was concluded after a 3-year study financed by a Commonwealth Special Research Grant. The study showed that does could be treated with hormones to induce oestrus and alter their normal kidding patterns to autumn instead of spring. Pregnancy testing by enzyme-linked immunoassay techniques was undertaken as an adjunct to this study.

Improved feeding systems for winter were investigated. This resulted in a programme for establishing, maintaining and using a predominantly pasture-based system suitable for does that kid out of season.

Alternatives to fresh goat milk were examined, and variations in milk composition and the cause of undesirable flavours were emphasised.

Dairy herd improvement services

Demand for herd-recording services increased by 9.2% over 1983-84. More than 40% of dairymen (1015 herds) were registered for herd-recording services (931 of these were actively using the service). This compared with only 16% 6 years ago.

A total of 73 275 cows completed lactations in the 1983-84 recording year. Their average yield in 279 days was 3395 L of milk and 133 kg of butterfat. This was the highest average recorded yield under the Queensland Herd Recording Scheme.

Genetic development

Queensland dairy farmers continued to provide ever-increasing support to the Holstein-Friesian Bull Proving Scheme, with 37% of dairymen taking part in the scheme.

AFS semen sales were encouraging. Between December 1984 and May 1985, a total of 9000 doses of AFS semen were sold overseas. Further semen exports were to be made to New Zealand, where AFS heifers were to be evaluated with Sahiwals and F1 Sahiwal-Friesians.

Artificial breeding

Increased semen sales, particularly in the beef industry, were boosted by a growing market for A.B. and herd improvement equipment and an increased demand for processing semen from privately owned bulls.

Privately owned bulls, particularly beef bulls, comprised a growing husbandry responsibility, with a total of 60 bulls (20 at Ormiston A.B. Export Centre, 11 at Wacol A.B. Centre, and 29 at the Dairy Herd Improvement Laboratory, Wacol) being collected during the year.

Processing of restricted (custom-collected) semen increased by 66% over the same period in 1982-83, with 76 181 doses placed in storage. The improvement in beef prices and importations through Cocos Island contributed to the beef industry's enhanced interest in artificial breeding.

Ormiston A.B. Export Centre was approved for exporting bovine semen to the United States in early 1985. Only one other centre in Australia has received this approval.

The A.B. Centre was maintaining a strong A.I. training effort after a record 1983-84 year. A total of 34 courses with 331 trainees were conducted. Included were two beef courses.

Preparations were made for an increased beef-training component in late 1985.

Dairy pasture research

Results of a trial showed that clovers help to extend the growing season of temperate pastures. The requirement for irrigation and management is high, if clover pastures are to be carried through summer and maintained as permanent pastures. Clovers did not perform well under heavy stocking and, if only a limited area of temperates is to be planted, nitrogen fertilised ryegrass would be more productive. At moderate stocking rates (5 to 6 cows/ha), clovers may offer a cost saving for nitrogen fertiliser.

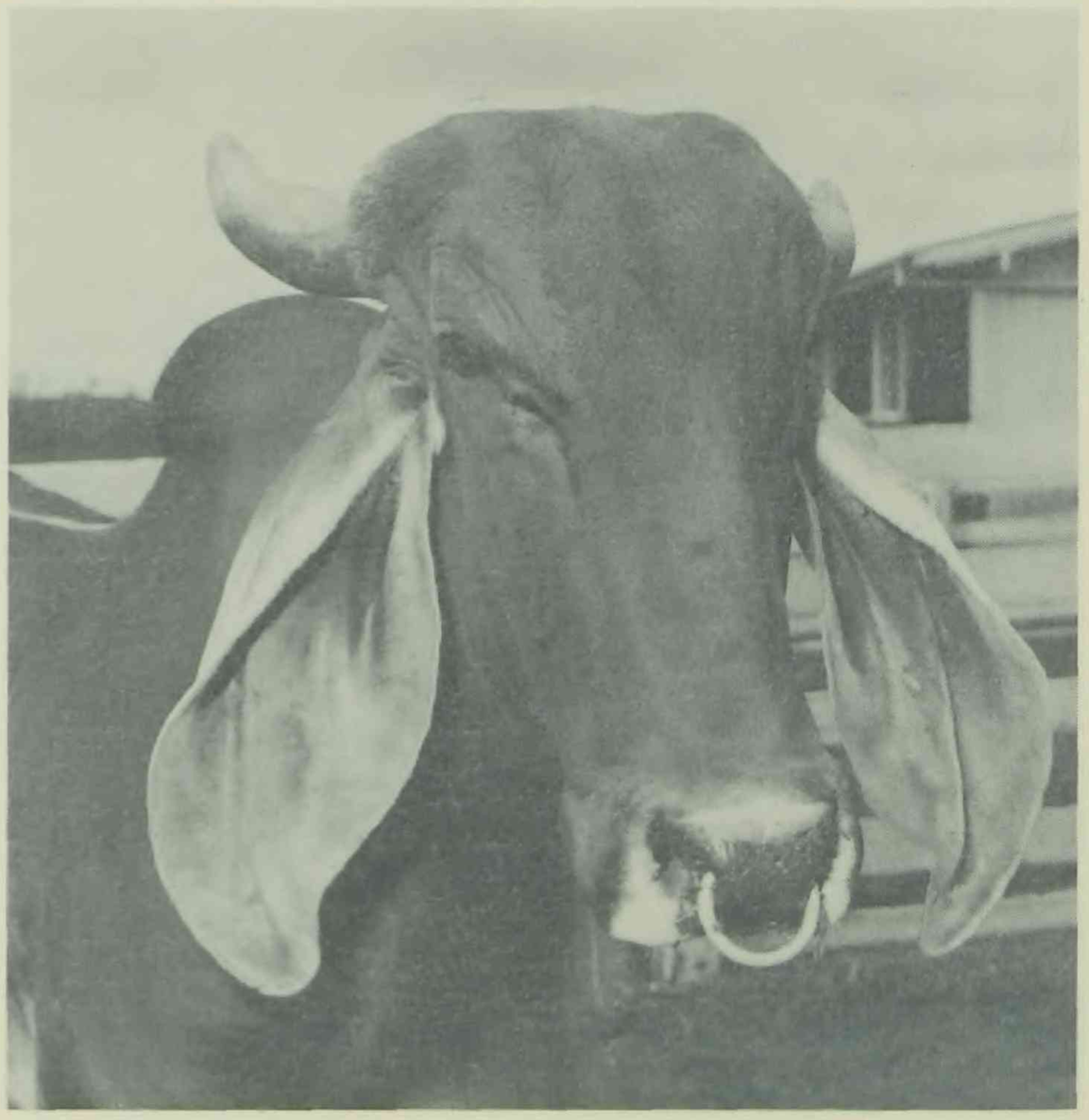
The ryegrass Midmar, a cultivar based on diploid *Lolium multiflorum* material, has shown superior performance in south-east Queensland. Midmar matures later than Tama and provides feed of higher quality for about one month longer. Midmar increased milk yields by an average of 8% in 1983 and by 13% in 1984 relative to Tama.

Results from nitrogen-fertilised grass pastures in central Queensland confirmed the value of farmers applying urea according to long-term rainfall probabilities rather than subjective opinion on prospects for rain.

After 3 years it was anticipated that the average milk response to nitrogen would exceed the target of 5 L of milk/kg of urea, demonstrating the value of fertiliser for reducing seasonal fluctuations in milk supply while at the same time containing costs.

A field research programme was begun on 12 south-east Queensland farms in October 1984 to evaluate the response of dryland pasture to different levels of nitrogen fertiliser. This project will provide dairymen and extension officers with facts about the economics of using nitrogen fertiliser as a management tool for maintaining efficient and cost-effective dairy production.

The very long ears of this Indo Brazil bull are one way to eliminate heat. He is just one of the privately owned exotic breeds of bulls imported to Australia through the Cocos Islands. He is to be used in conjunction with a Brahman breeding programme in Queensland. Semen has been collected at the DPI's Wacol A.B. Centre.



Artificial breeding of stock legislation

Forty-seven Certificates of Registration of premises and 186 Certificates of Competency were currently issued under the artificial breeding legislation. This was an increase of 10 in the number of premises registered and a decrease of 10 in the number of Certificates of Competency.

The pig industry expanded into the commercial world of artificial breeding during 1984, with the registration of a centre for collecting, processing and transferring ova in pigs at the University of Queensland Veterinary School Farm at Pinjarra Hills and an artificial breeding centre for collecting, processing and distributing boar semen at the Queensland Agricultural College, Lawes.

The first sheep artificial breeding centre in Queensland was registered in October 1984 at the University of Queensland's Pastoral Veterinary Centre at Goondiwindi.

The first registered centre for goats in Queensland, the Brookfield Goat A.I. Centre, was registered in December 1984 to collect buck semen.

Food research

Reverse osmosis was shown to have great potential in the Queensland dairy industry for concentrating milk before transport, thereby reducing transport costs. Milk was concentrated on pilot-scale equipment to halve its original volume. When the concentrate was re-diluted with water, taste panellists could not distinguish it from the original milk and its storage life was increased by 2 days.

Cheese, yoghurt and pasteurised milk that were produced using milk from cows with mastitis were of poorer quality than similar products made from the milk of healthy cows. Manufacture was also more difficult. This work illustrates that mastitis can cause losses not only in milk production but also in product manufacture, and supports DPI efforts to control mastitis.

Cheddar cheese matured more quickly when either cultures of a modified starter or naturally-occurring enzymes were added during cheese making.

The combination of these treatments with the higher ripening temperature of 15°C resulted in the shortest ripening time and the biggest saving in storage costs.

A major achievement was the production of sensitive and specific antisera (containing monoclonal antibodies) against the bacterial enzymes that are the most common cause of spoilage in refrigerated milk. This method is suitable for rapidly detecting very small amounts of these enzymes in raw or pasteurised milk products. Hybridoma technology, a bioengineering technology, was used to produce the antisera.

Fluorogenic media promises to become a useful tool for microbiological analysis of food products. The technique developed not only estimates the number of bacteria present but also indicates the types present and the sources of their entry into the product. A range of procedures was evaluated. These will pinpoint raw-milk quality problems, provide a sensitive indicator of process contamination and provide estimates of product shelf life.

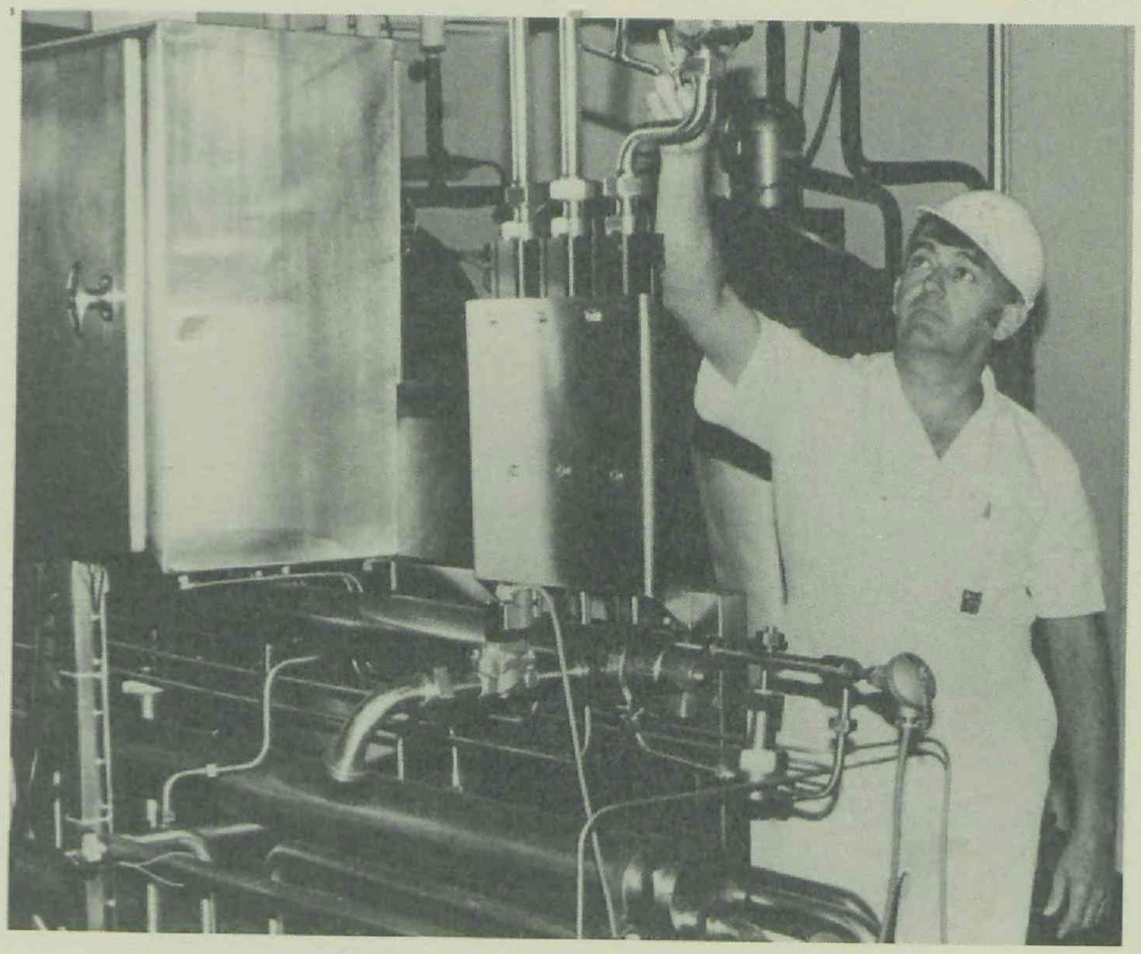
Revision of the computerised system for reporting the results of liquid-milk quality assessment to the dairy industry resulted in a greatly improved system. This scheme will help develop similar programmes for other food products. New equipment now allows data entry directly to the system from both the Brisbane and Malanda laboratories, thus reducing the result reporting time.

A major research programme began to improve the profitability of the Queensland tuna fishery. This work should help the Queensland industry to produce high-quality yellowfin and bigeye tuna for the lucrative Japanese sashimi market. Different methods of catching and handling the tuna were being used to produce fish of the highest possible quality. Alternative uses for any fish not meeting the high standards required for sashimi, such as smoking, were being examined.

The concept of marketing light, soft red wines immediately after vintage culminated in the release of Balandean Noveau. A streamlined processing sequence was designed to accomplish the red style suitable for early consumption. A new label design common to all Granite Belt producers of the style was being used to promote the product.

A study of the combined effects of common industrial and household beef-handling practices on the attributes of beef palatability to consumers was initiated. Surveys of butcher shops and Brisbane households provided valuable initial data on common handling practices. This work was being carried out as a cooperative project with the Livestock and Meat Authority of Queensland.

Pilot-scale reverse osmosis equipment at the DPI's food research laboratory, Hamilton, removes water from milk using low temperature filtration that does not affect the flavour. This technology can reduce milk volume by half and could help the Queensland dairy industry make large savings in milk-transporting costs.



PLANT INDUSTRY HIGHLIGHTS

Agriculture

Studies with a cone thresher at Gympie demonstrated a simple method of greatly improving the handling qualities of the chaffy seeded grasses such as Rhodes grass (*Chloris gayana*), Hatch Creeping bluegrass (*Bothriochloa insculpta*) and Indian bluegrass (*Bothriochloa pertusa*). The awns, sterile florets and surface hairs are removed without any apparent effect on seed viability.

A long-term study was begun in central Queensland to monitor the effects of land use and management on tree and shrub populations in the eucalypt woodlands. Over 23 sites, 13 km of transects were established in areas that represent 55% of the *Eucalyptus* spp. communities.

Studies using fire to control weed species in western Queensland showed good control of green turkey bush (*Eremophila gilesii*) and two hop bushes (*Dodonaea attenuata* and *D. tenuifolia*), but not turpentine bush (*Eremophila sturtii* or *E. bowmanii*). Spring and summer burns were most successful and these treatments also prevented seedling regeneration.

Following a joint assessment with CSIRO, cultivar Shaw of creeping vigna (*Vigna parkerii*) was released for use in the higher rainfall areas of the Near North Coast. It is a persistent legume that withstands heavy grazing.

Use of leucaena tree legumes continued to be extended with remarkable success. Many commercial areas of leucaena had been planted in coastal and inland central Queensland. Interest in using this tree legume was well developed in the Moreton area, where forestry seedling establishment and transplanting techniques greatly improved the growth rate and viability of using leucaena. Leucaena was also being evaluated in programmes to replace lantana.

Pasture development of a wide range of grasses and legumes attracted widespread interest. The use of a range of stylo legumes and the evaluation of other legumes particularly in the Burnett was attracting widespread interest among graziers. Significant commercial areas were sown. The use of para grass and other water-growing grasses also attracted much interest in coastal areas.

A highly significant project involving improved pastures evaluation was begun to help north Queensland property managers successfully implement brucellosis and tuberculosis eradication programmes. Significant areas of *Stylosanthes* legume pastures were planted to enhance cattle control and holding for disease testing.

Two new soybean varieties, Dragon and Nessen, came into full production. Despite the presence of bacterial pustule in Nessen, farmers commented favourable on both varieties.

Centaur, a quick-maturing sister-line of Dragon, was released from Hermitage Research Station, near Warwick, and was undergoing seed multiplication. Like Dragon, Centaur has a high level of field resistance to phytophthora root rot and is resistant to bacterial pustule. It has the added advantage of tolerance to manganese toxicity and is expected to replace Bragg, which it has out-yielded by up to 30%.

QK958, a new hybrid maize variety for the Atherton Tableland, was released from Kairi Research Station late in 1984. Seed production of the new hybrid was underway. In 10 trials over two seasons, the new hybrid produced 7.35 t/ha compared with 6.93 t/ha for QK657A, the hybrid now commonly used. QK958 has superior resistance to Polysora rust, lower ear height, and better resistance to lodging than any other hybrid yet grown on the Atherton Tableland.

The most severe epidemic of wheat stem rust seen in Queensland for many years severely damaged wheat crops, particularly the variety Oxley and the early-planted crops in the northern parts of the wheat belt.

A far-reaching result of the epidemic was the appearance of a variant of the Oxley-attacking rust. By the end of the season, this new stem rust had become wide-spread in southern Queensland and caused some damage in the variety Cook. It had also rendered valueless potential new varieties not yet released. However, one new variety, Vasco, has resistance to the disease and this will give producers a replacement for Oxley in future crops.

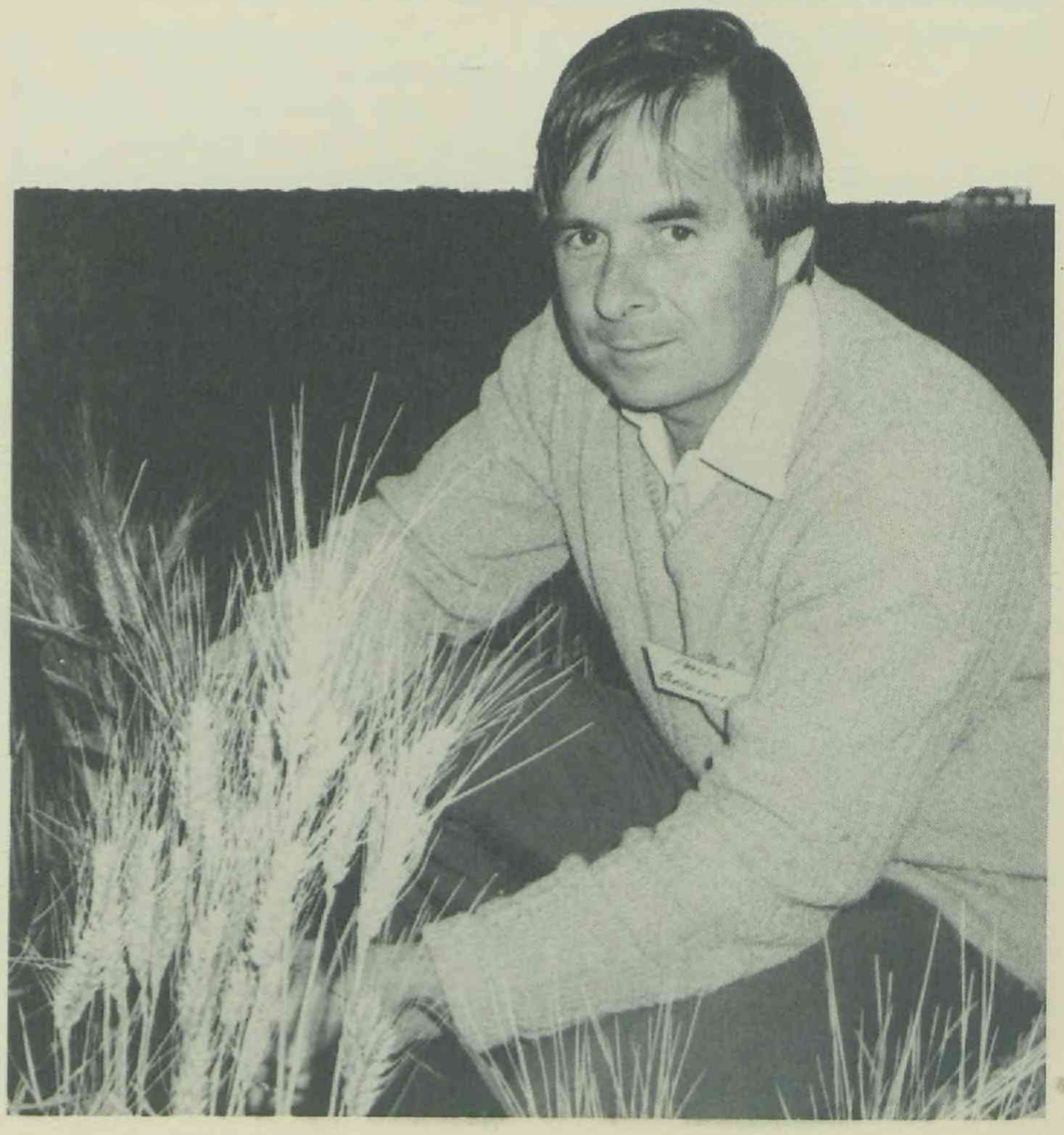
A project to determine how to get high yields from dwarf-type sorghums in tropical areas began 3 years ago. Central Queensland results indicated that a number of parents adapted to the tropics gave higher grain yields when used in hybrid varieties than did temperate-based parents. Higher yields were associated with higher dry-matter production in hybrids of similar maturity. Further studies were determining whether different plant populations and arrangements are better suited for the tropically adapted hybrids.

Paradoxa grass had become a serious problem in wheat and barley in recent years. In barley, control was readily achieved with trifluralin; in wheat, control was achieved the herbicide 'Glean', which must be applied before the planting rain. With 'Glean', wheat yields increased by between 50% and 100% in areas with paradoxa grass populations of from 700 000 to 6m seedlings/ha.

Extension and development projects in reduced-tillage fallow management as a component of conservation cropping systems advanced considerably after support from the National Soil Conservation Programme. Farmer adoption of herbicide substitution for tillage increased significantly as did the practice of stubble mulching.

Important advances were made in developing cropping techniques in coastal areas. These projects began as a search for alternative crops to sugar-cane. Crops being researched include grain sorghum, maize, soybeans, navy beans, pigeon pea and kenaf.

Queensland Wheat Research Institute senior plant breeder, Dr Paul Brennan, inspects the summer-seed multiplication plot of the newly-released variety, Vasco.



1. This is one of a range of new, experimental grain-sorghum hybrids on trial west of the Atherton Tableland. The DPI is currently undertaking extensive physiological research to establish grain-sorghum breeding lines suited to the tropics.

2. Cast and crew on location during the shooting of the beef promotion film, *Tough or Tender*. Released early in 1985, the film was shot in a Brisbane butcher's shop. The 10-minute film (also available on video cassette) promotes beef as a necessary and desirable part of the diet and emphasises the importance of customers asking their butcher's advice about meat cuts and cooking.

3. The bulldozing of mulga continued to be the mainstay of drought supplementation programmes in south-west Queensland in 1984-85. DPI beef cattle husbandry and sheep-and-wool officers at Charleville were investigating ways to improve livestock's utilisation of high mulga diets by feeding various nutrients through the drinking water.

4. Chickpea, a winter-growing grain legume, is increasing in popularity in traditional wheat-growing areas of Queensland. The DPI has contributed to the success of the crop through varietal selection and agronomic research.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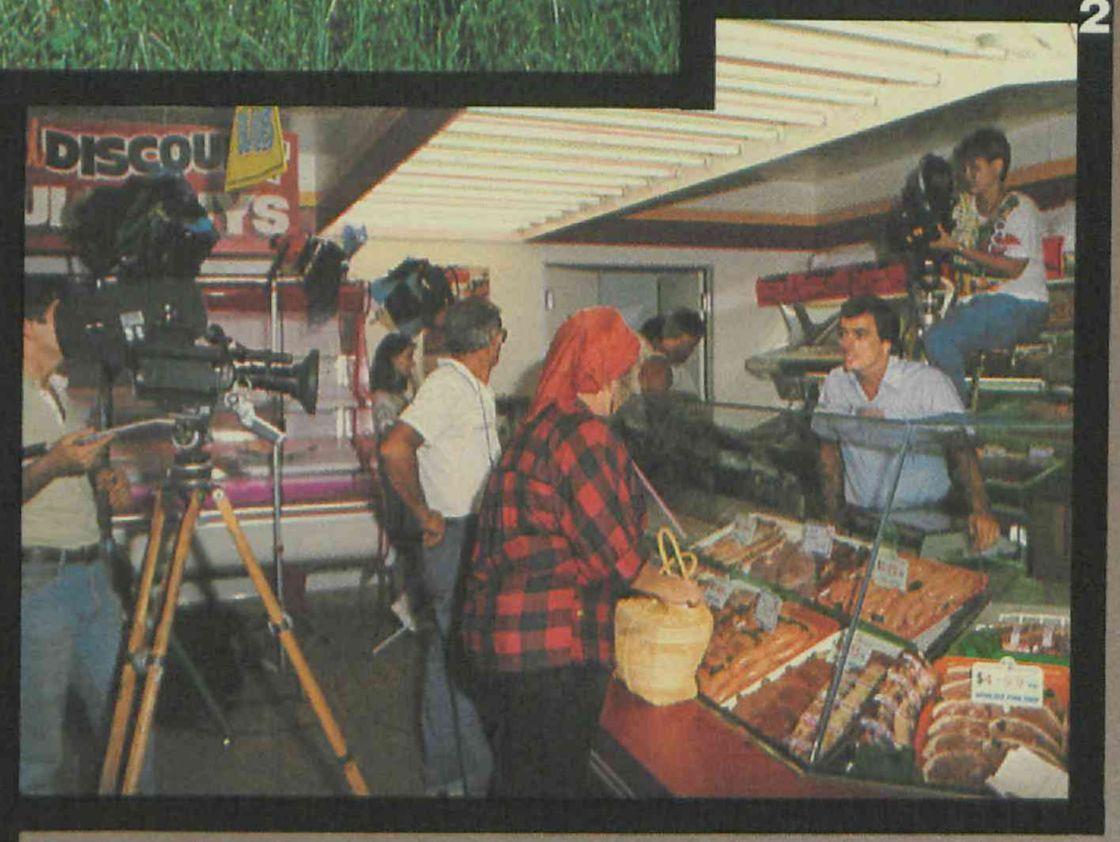
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QUEENSLAND PRIMARY INDUSTRIES

1. DPI soil conservation officers designed and surveyed soil conservation measures on 71 000 ha of cropping land in 1984-85, an 11% increase on last financial year. Parallel contour banks, waterways and strip cropping protect this sloping land on the Artherton Tableland from soil erosion.

2. The DPI tagged 220 sand crabs using a special gun, as part of an intensive study of the Moreton Bay sand-crab fishery to investigate claims of overfishing.

3. Daru villagers work beam-trawl gear from a sail-powered outrigger canoe to catch banana prawns, as part of a fisheries development project that the DPI conducted in collaboration with Papua New Guinea fisheries officers.

4. The wheat variety, Oxley, was phased out of production in Queensland in 1984 after it became severely affected by stem rust disease. It has now been replaced by the rust-resistant variety, Vasco, which is the latest product of the DPI's breeding programme for the Queensland wheat industry. The smaller photo is a close-up of stem rust pustules on a wheat stem.

5. Soldier beetles, which can vary from 3 to 18 mm in size, are welcomed by growers in all their crops. These beneficial insects are carnivorous and attack many of the insect pests that reduce crop yield and quality.

6. The DPI's active research programme on cashmere production is helping this young industry to grow. Cashmere is the fine underdown produced by particular goats.

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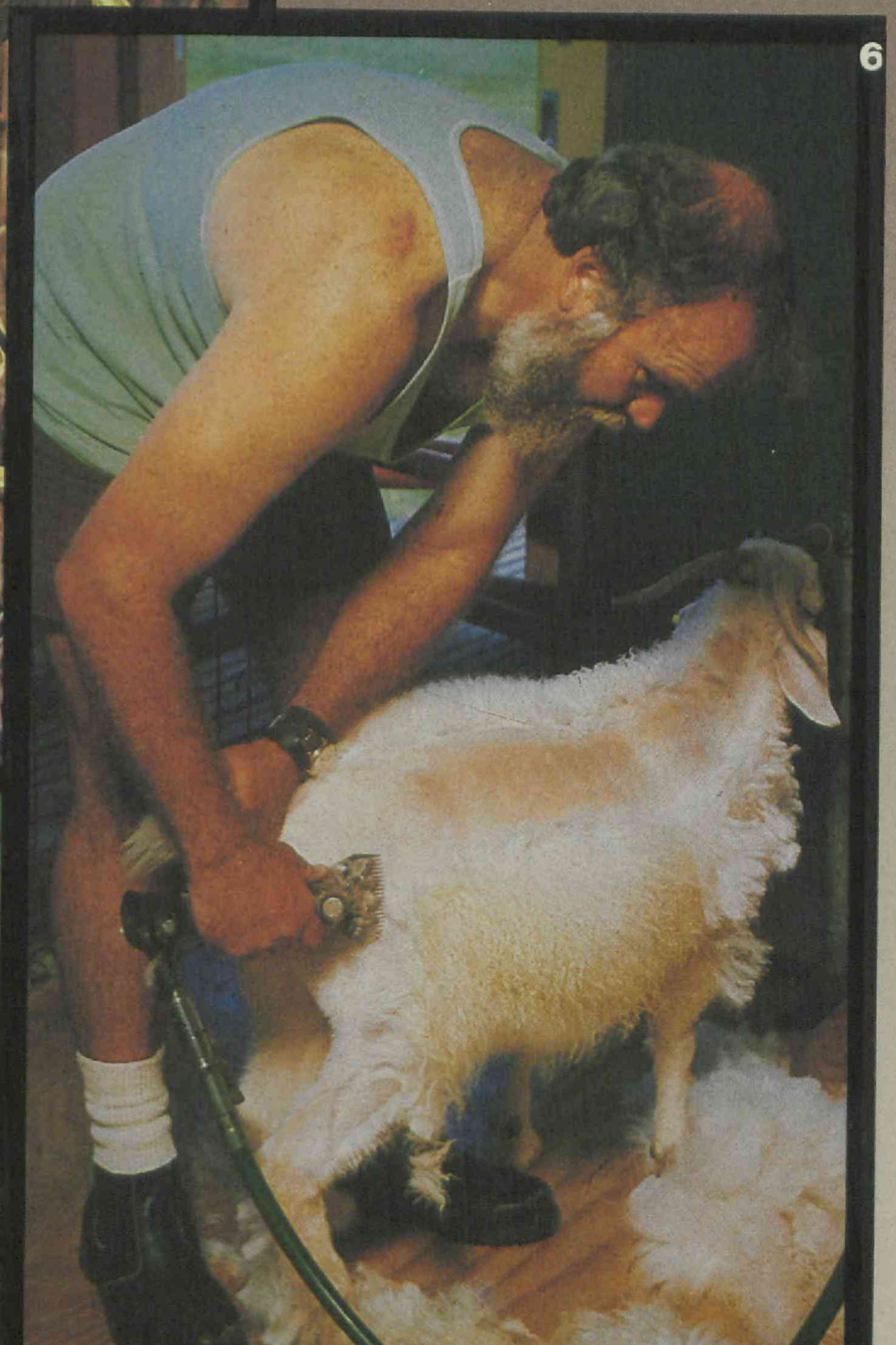

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1. The Tommy Atkins mango is among the mango varieties that the DPI is testing in various parts of Queensland. The objective is to extend the narrow 6-to-7-week harvest season by producing fruit before and after the present long-time industry standard, Kensington Pride.

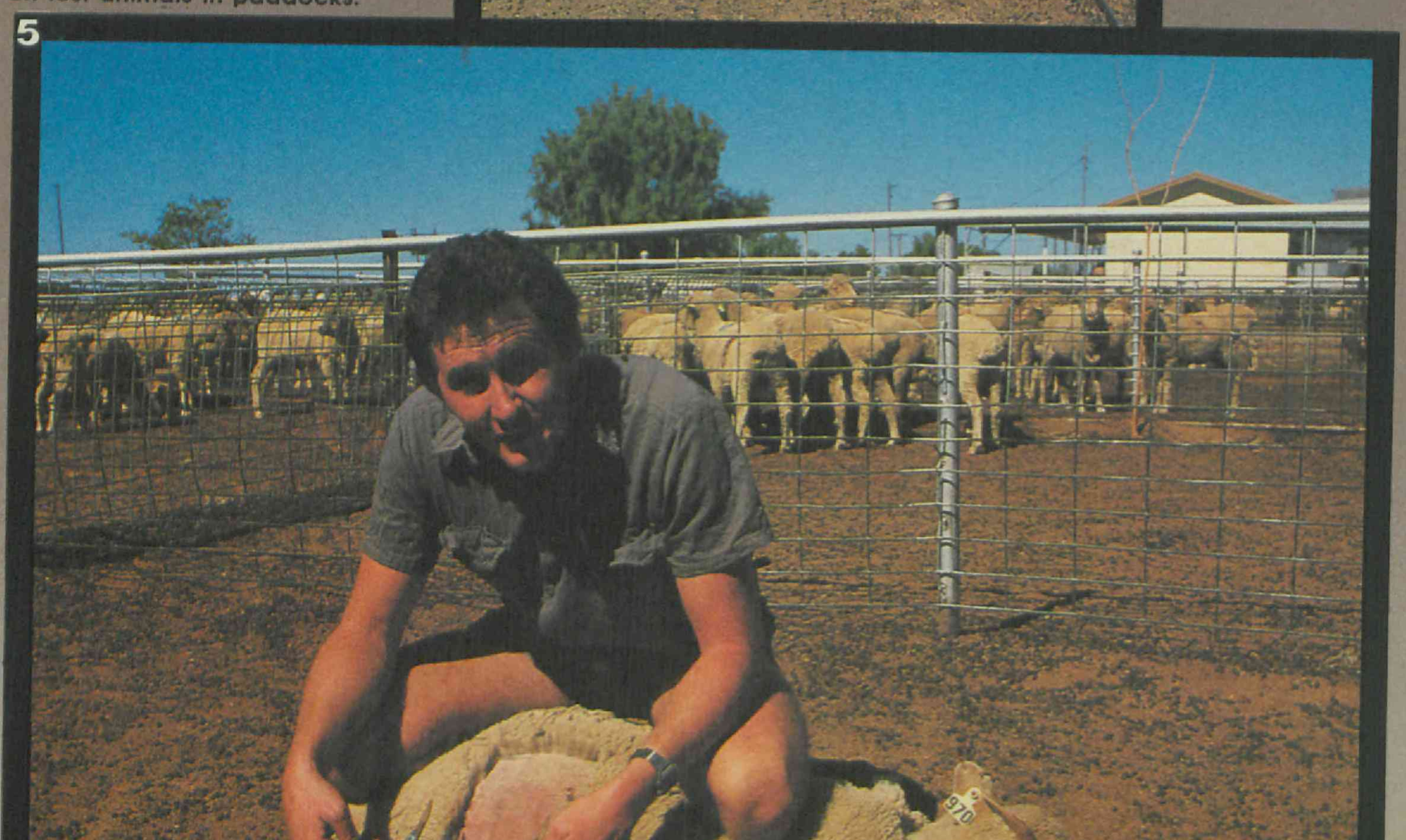
2. Avocados are a popular sub-tropical fruit with an increasing number of Australian consumers. In the last decade, the industry has mushroomed. Production is now almost year round, with different climatic districts maturing their crop at different times of the year for the same variety.

3. The rambutan is one of the new tropical fruits that the DPI and enthusiasts are considering for growing in tropical northern Australia. Irrigation is necessary, as this fruit is native to West Malaysia and Sumatra and grows in high-rainfall areas.

4. The DPI's 15 000 hectare 'Toorak' Sheep Field Research Station, near Julia Creek, provided an ideal natural laboratory for testing new, and economic, drought-feeding methods for sheep grazed in Queensland's semi-arid regions. The addition of salt to urea-molasses drought feed showed promising returns.

5. The wool-growth promotant, methionine, holds promise for producers who wish to increase their clips. Research at 'Toorak' has shown that a mixture of the sulfur-amino acid, methionine, and bentonite clay fed through drinking water can increase wool growth by up to 43% in groups of penned sheep and by up to 30% on test animals in paddocks.

All three of these fruits are discussed in detail in the book, *Tropical Tree Fruits for Australia*, which the DPI sells.



In grain-growing areas, extension and development projects were seeking to improve the reliability of grain cropping. The use of press wheels and narrow points on planters was promoted to improve crop emergence and establishment. Other aspects to receive attention included appropriate fertiliser strategies, the use of baits and insecticides in soil-borne insects and correct pesticide application.

Interest in using grain legumes in crop rotations on the Darling Downs and in the South Burnett and Dawson Callide districts increased markedly. Great advantages are to be had from using grain legumes in soil protection, fertility enhancement and farm profitability.

Database systems for storing and retrieving crop statistics were developed on NEC computers to provide much quicker and easier access to this information than previously possible. The systems feature ready comparison with historical data, graphical output and ability to be run at regional centres.

Design and analysis of plant-breeding experiments were improved through a wider range of available methods, after a biometry workshop and a special session at the Australian Statistical Conference in Brisbane. A research project to improve the efficiency of selection procedures was initiated.

Horticulture

The demand for horticultural advice continued to increase, as did the number of new growers, new crops and new production techniques. Common-interest producer groups were established in many districts to allow DPI officers to communicate with many producers at one time and to increase the information flow between producers.

Fruit growers in the North Moreton region reported higher confidence in timing their crop-management operations, after consulting crop-management calendars provided by extension horticulturists. Calendars were produced for each of 10 crops, showing the timing of all major production operations.

Trickle irrigation had been adopted by more than 500 Bundaberg district vegetable growers, after 4 years of extension activity. They are very satisfied with the about 20% saving in water usage compared with the previous spray irrigation; the better pest and disease control; the saving in labour requirement; and the average yield increase of about 25%. About 90% of Bowen growers were using trickle irrigation on at least part of their area, so that 40% of the production area was trickle irrigated. The water saving resulting from the change from the previous flood irrigation was proving particularly useful in these years of low rainfall.

Granite Belt apple growers were benefiting from a project to improve the prices for Queensland apples on the Brisbane Markets. Surveys by DPI marketing extension services identified the major factors associated with these lower prices, most of which related to fruit appearance. The survey results were presented to growers at grower nights. Further extension was being organised, but growers had already responded by improving their post-harvest handling methods. Several growers replaced roller graders with weight graders; 21 more washing and polishing units were installed; and some of the larger orchardists installed fruit-waxing equipment.

A system for propagating citrus in containers was developed for Queensland conditions. The trees are grown in a sand-and-sawdust potting mix in plastic containers instead of in the field beds used previously. The trees can be grown quickly, are free of soil-borne diseases and nematodes, and are suitable for retail sale or for use by citrus orchardists. A publication describing the system was produced, a field day was held and nurserymen were individually helped to convert to the system. As a result, at least five nurserymen and four orchardists were using the container system to produce citrus trees.

Lockyer Valley farmers benefited from a special extension project to help them deal with their salinity problems. More than 100 farmers obtained individual advice on their best strategy and 12 changed to a trickle system for irrigating their vegetables. Demonstration plots of asparagus showed that this crop can cope with moderately saline water, and much interest was generated throughout south-east Queensland in growing asparagus.

The tomato variety, Delta Contender, released from Bowen Horticultural Research Station in 1984, became the major tomato variety planted in that district. The variety produces high yields of quality fruit that ripen in a concentrated maturation pattern. Two advanced breeding lines similar to Delta Contender, but also having resistance to Fusarium wilt Race 3, were being extensively trialled in the district and a commercial release was possible soon.

The apple breeding line 35-155 was provisionally released for commercial evaluation on growers' properties in the Granite Belt. Fruit of the variety are similar to Delicious, but ripen 4 to 6 weeks earlier in late December to mid-January. The variety shows potential for taking full advantage of the Granite Belt's position as the earliest apple-producing district in Australia.

Harvesting of 57 varieties of Arabica coffee introduced from overseas since 1981 began at Southedge and Kamerunga with Catuai, Catimor, Blue Mountain Kenya, SL34 and K7 performing best in the north Queensland environment. The processing qualities of the varieties were being evaluated. Agronomic studies were developing

New cabbage varieties on trial at the DPI's Redlands Horticultural Research Station, Ormiston, are regularly inspected by growers to compare the new varieties' performance with standard varieties. Here a DPI experimentalist points out characteristics to growers at the station's open day on 18 October 1984.

management techniques for machine-harvesting the crop.

A major banana variety introduction programme was in progress to identify commercially acceptable varieties resistant to Black Sigatoka leaf spot disease and Fusarium wilt Race 4. The former disease was endemic in Cape York and the latter was affecting many properties in the Wamuran district of southern Queensland. The varieties Calypso, SH-3362 and SH-3436 from the Honduras breeding programme show most potential.

Trials in the environment-control facility at Maroochy Horticultural Research Station confirmed that low temperatures during fruit maturation and ripening caused blackheart in pineapples. Cool-storage trials at Sandy Trout Food Preservation Research Laboratory had identified low temperatures as the most likely cause of blackheart. Temperatures of 20°C and below, during the final 3 to 5 weeks of fruit growth, result in blackheart development. The fruit's tropical nature renders it susceptible to chilling injury at temperatures that normally would not be expected to harm fruit crops.

The first commercial export of Australian citrus to Japan occurred in 1984, with about 10 000 cartons of Navel oranges and 30 000 cartons of Valencia oranges being exported from the Central Burnett district. The DPI had been involved with the development of the technology used, including disinfestation and packaging systems.

Five new trials were begun at Walkamin, Gunalda, Gympie, Glasshouse Mountains and Lismore to compare the performance of a range of Hawaiian and Australian macadamia selections. Fifty-six selections, with potential for further development, had been identified. A trial at Beerwah demonstrated advantages for the Australian selections, Mason 97 and Daddow, over the main Hawaiian varieties. For the third year, nitrogen was shown to modify the timing and extent of vegetative flushing, flowering and yield in macadamia, with best results in June and April before anthesis. Boron foliar sprays increased yield and nut quality. High temperatures and low humidities were shown to increase nut drop.

A range of advanced papaw lines, from breeding programmes at Maroochy and Yarwun, were being evaluated on growers' properties. Large quantities of seed of select lines had been distributed to industry to improve crop types, uniformity and yield. A demonstration plot of selected clones propagated through cuttings had been established and a tissue-culture method for vegetative propagation was being developed.

A technique for tissue culture of ginger, developed at Maroochy Horticultural Research Station, successfully propagated an Hawaiian ginger clone. Plants were to be released to industry in 1985.

A technique was developed for producing callus tissue from banana meristems and for regenerating new banana plants from different parts of the callus. This was resulting in much variation in the plants produced, and it was hoped to identify a Cavendish plant with resistance to Race 4 Fusarium wilt. Irradiation and Fusarium fungal extracts were being used to increase variability. Eight hundred plants had been regenerated from adventitious budding and callus culture, and these were being screened for Race 4 Fusarium resistance.

A further 32 new stonefruit varieties were introduced from overseas and 34 from interstate. A total of 290 potential stonefruit varieties were being evaluated at the Granite Belt Horticultural Research Station. A total of 127 separate budwood distributions of promising new varieties were made to growers and nurseries.

A technique was developed to allow successful marketing of the tropical fruit, rambutan. The fruit is easily damaged and is susceptible to post-harvest disease that detracts from appearance. Growers used the chemical dip and punnet-pack system.

Entomology

SORPAK, a new computer-based sorghum-management package, was creating interest in the farming community with its potential for financial savings for sorghum growers. The package calculates and prints out detailed information on planting rates, fertiliser requirements, suitability of sorghum varieties, weed-control options and potential loss due to insect attack.

A major advantage is the programmed approach to sampling for pests. It provides the operator with precise guidance on when and where to sample for determining pest-infestation levels as the crop develops. In State-wide field tests, growers saved thousands of dollars in pest control because of the more accurate and more timely sampling methods.

Entomologists working from the DPI's Indooroopilly science laboratories began investigating control of twospotted mite (*Tetranychus urticae*) on ornamental plants grown in glasshouses and in the field. Where adjacent plants are in contact with one another for comparatively long periods in rose glasshouses, releases of a predacious phytoseiid mite, *Phytoseiulus persimilis*, control twospotted mite infestations during summer and autumn without the need for chemical miticide sprays. Chemical sprays may occasionally be needed during winter, but, even so, the number of sprays needed can probably be reduced from 20 to 25 a year to less than five.

Farmers were able to control elephant beetles as a result of successful field trials of synthetic pyrethroid insecticides. The beetles attack tropical tree crops in north Queensland. Damage to avocado and lychee crops in the region was averted.

Increased levels of antibiosis being bred into commercial soybeans could reduce the need to spray for *Heliothis* control. Antibiosis is measured by the growth rates of insect larvae feeding on the plant: the higher the level of antibiosis, the lower the growth rate. Antibiosis increases in all soybean

A DPI entomologist samples pest populations in a stored grain bulk to determine the effectiveness of chemical grain protectants. The DPI is involved in developing new grain protectants to control insects that have become resistant to existing products.

plants with increasing plant age, but it increases more rapidly in resistant varieties than in existing commercial ones. *Heliothis* larvae that experience lower growth rates take longer to develop and, consequently, are exposed to predators, disease organisms and insecticides for a longer period.

Rates of the granular insecticide carbofuran as low as 0.25 kg active constituent/ha significantly reduced the percentage of damaged peanuts in field trials at Kingaroy. The insecticide is applied at planting to control scarab larvae, which are significant pests of peanuts in the region. Damage consists of surface scarification of nuts as well as penetration of the shell and destruction of kernels.

Broadcasting of 'Beetle Bait'—a cracked grain, vegetable oil and insecticide mixture—on the soil surface after planting improved maize-seedling establishment and reduced plant lodging by controlling black field earwigs, in trials in central Queensland.

Growers achieved successful results when baits were used for the first time to control infestations of the pest in commercial plantings of maize and sunflower. The method was devised originally to control infestations of soil-inhabiting insects, such as false wireworms, in the Central Highlands and achieved notable success in protecting sorghum and sunflower crops from those pests.

A simulation model of the population dynamics of the eastern false wireworm (*Pterohelaeus darlingensis*) was constructed. It tests various management strategies and forecasts population levels. Simulation of different crop rotations and of different planting dates found that a winter crop of wheat or barley provides the best single-crop situation for *P. darlingensis* development.

Double-cropping both increases survival and speeds development, while a single summer crop drastically reduces the expected size of the population. However, a change in the planting date of wheat has little effect on the numbers of subsequent young adults or on the timing of adult emergence.

In pest management studies done in avocado orchards in the North Moreton region, fruitspotting bugs of various ages were caged separately on individual fruit to determine the number of bug feeds that might be responsible for an observed amount of damage. Adult bugs and nymphs that were almost mature fed about six times a day, and each feeding puncture usually caused enough damage to result in downgrading of fruit quality at harvest.

Younger, juvenile bugs fed about half as often and caused less severe damage, which was often similar in appearance to 'typical' fruit-fly stings. This discovery has helped explain why, firstly, fruit flies have been blamed for so much damage and, secondly, why bug control often has been poor. Growers, mistaking damage by young bugs for fruit-fly stings, have applied the standard insecticide for fruit-fly control, dimethoate, which is now known to be unsatisfactory for spotting bug control.

Fungicides used for disease control in deciduous fruit orchards were tested in a field trial at Thulimbah to determine which were least harmful to the phytoseiid predator *Typhlodromus pyri*. The phytoseiid, which effectively controls European red mite, is an important part of the biological control programme for orchard mites in the Granite Belt.

None of the test fungicides caused total mortality, but some were considerably more toxic than others. The least harmful were dodine, dithianon, biloxazol + Agridex®, captan, captafol, fenarimol and ziram. Numbers of *T. pyri* were much lower on trees sprayed with metiram, metiram + nitrophal isopropyl, mancozeb, thiram and DEK.

The mite biocontrol programme devised for Granite Belt orchards was developed in conjunction with cover sprays of thiram for disease control, but, clearly, it would be better if thiram were replaced with a less harmful fungicide.

A comparison study of broccoli, radish and cabbage plants at Ormiston looked at their reactions to simulated leaf damage. Acceptance of a certain amount of damage is inherent in any pest-management system, and it is important to know how much each kind of crop can tolerate without excessive loss of yield.

For cabbages, market demands for blemish-free produce restrict acceptable damage to leaves that are not present on the marketed head. Cabbages can tolerate removal of 25% of the leaf area of up to 17 of the first-formed leaves without appreciable head loss. However, the economic advantage in accepting a 25% leaf-area loss is small. The period for production of 16 to 17 leaves is only a small part of the growth period for cabbage, and also a time of slight insecticide usage.

For curd crops such as broccoli the marketed floral part forms much later in the growth period of the plant. Broccoli has displayed a degree of tolerance to continuous removal of leaf areas, which makes this crop more amenable to a pest-management approach.

Plant pathology

Stripe rust developed early in the season in the Miles-Condamine area and spread throughout south Queensland. Disease severity was generally low.

Black Sigatoka remained confined to bananas in the northern part of Cape York Peninsula and a few islands of the Torres Strait. A second attempt to eradicate the disease was not undertaken because the chances of success were considered to be minimal. A publicity campaign, initiated in 1981 to inform local residents and travellers of the prohibition on the movement of bananas from the Torres Strait region to other parts of Australia, was expanded.

Cucurbit powdery mildew has proved difficult to control in many areas of Queensland. In a study of 15 isolates of the causal fungus from various parts of Queensland, all were resistant to benomyl and seven exhibited varying degrees of resistance to triadimefon.

Solarisation, which involves heating soil by covering it with thin, clear-plastic sheeting for several months during summer, gave good control of Verticillium wilt of tomato at Redland Bay, but did not control

A DPI virologist uses aphids to transmit barley yellow dwarf virus to oats to investigate the natural reservoirs of the virus and vectors, and also to study the incidence of this serious disease of grazing oats in Queensland.

Fusarium wilt in the Bowen district where race 3 of the pathogen was spreading and posing a serious threat to the future of the tomato industry.

Phytophthora root rot of avocados was generally controlled by mulching the soil under the trees and applying fungicide (fosetyl or metalaxyl). Comparable results were obtained at a fraction of the cost of conventional fungicide treatments by injecting trees with phosphorous acid.

This chemical is not registered for commercial use.

Race 4 of the fungus that causes Panama disease continued to spread slowly in banana plantations in south-east Queensland. Exotic banana cultivars were introduced from Honduras, the Cook Islands, South Africa and the Philippines and were being tissue cultured before their resistance to Panama disease was tested.

Phytophthora root rot of soybean was recorded in the major growing areas of southern Queensland, but not in the Central Highlands or north Queensland. The cultivar Nessen, developed in cooperation with the DPI's agriculture branch, was not affected.

Anthracnose remained the major problem of *stylosanthes* in tropical pastures. More than 300 DPI plant selections, in addition to promising lines from the Townsville CSIRO laboratory, were screened for resistance. The most promising were to be bulked for final field testing and selection. An interim line might be released from this work to replace Fitzroy.

Zucchini yellow mosaic virus was established in the Bowen district and south-east Queensland where it affects a range of cucurbits. Zucchinis are more severely affected than pumpkins, cucumbers and melons. Seed of all cucurbit crop types from infested areas was being tested to determine whether the virus is seed transmitted.

Further studies in the Burdekin on poor rice growth caused by needle nematodes revealed interesting aspects of the biology of the pest. Nematodes aggregate around rice roots and begin to feed after the crop is flooded. Once permanent water is removed, nematodes survive in a quiescent state, mainly at depths of 15 to 25 cm.

Bacterial blight of cotton was widespread in central and south Queensland. The high level of seed transmission in acid delinted commercial seed proved to be a major source of primary inoculum. In dry years seedling blight is minimal despite a high inoculum level in the seed, but under favourable conditions severe seedling blight occurs with a buildup of bacterial blight in the crop and subsequent yield loss.

Citrus canker was found on West Indian limes and sweet orange on Thursday Island in May. All Thursday Island citrus trees were surveyed and diseased trees were destroyed. The disease has not been found on the Australian mainland or on other Torres Strait islands.

Bacterial black spot is the most serious disease facing the expanding mango industry. An integrated control programme involving windbreaks and regular fungicide sprays to protect new growth flushes and fruit gave promising results. Several varieties from Florida exhibited useful levels of resistance.

Botany

Forty new species of plants were described by taxonomic botanists. In addition, 12 species were recorded for the first time in Queensland; nine of these were new to Australia.

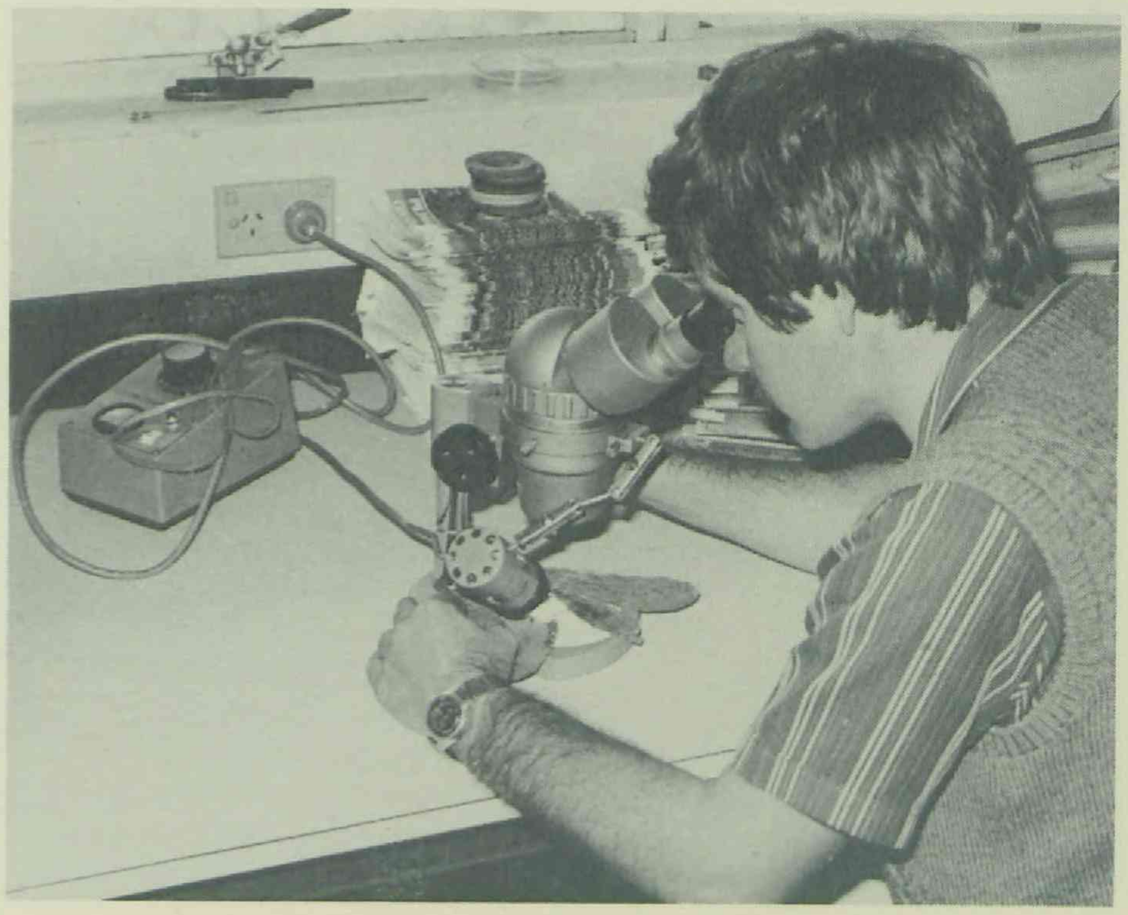
Plant specimens totalling more than 14 000 were identified for primary producers, consultants, DPI staff, other State and Commonwealth departments, tertiary institutions and the public. Advice on poisonous properties, weed potential and control and distribution was supplied for many of these. Such identifications increased 17% over the 1983-84 total.

Certificates of identification under the *State Health Act* were issued for 2473 cases involving samples of *Cannabis sativa*. In addition, identifications were required for 55 seizures made under the *Customs Act*.

The first two vegetation maps and booklets of the *Vegetation Survey of Queensland*—South Central and South Western Sheets, covering about 20% of the State, were released. These vegetation maps at a scale of 1:1 000 000 form one of the resource bases used in planning land use and organising research priorities.

A summary report and species list for the coastal Moreton region was published. Based on previously published vegetation maps of the region, the report discusses the relationships of the vegetation and flora of the region in an Australian context, provides information on the status of rare and threatened plants and recommends on conservation and research management.

A DPI botanist examines a plant specimen submitted for identification. In 1984-85, DPI botanists identified more than 14 000 plant specimens for primary producers, consultants, other DPI staff, other State and Commonwealth departments, tertiary institutions and the public.



LAND MANAGEMENT HIGHLIGHTS

Erosion incidence

Soil erosion throughout the State was generally low due to the moderately dry seasonal conditions. This sharply contrasted with the severe soil losses recorded between 1982 and 1984. The extensive cropping lands recorded low levels of soil erosion except in isolated areas, but severe sheet, rill and gully erosion occurred on the southern Darling Downs and in the Mundubbera district.

High levels of soil loss occurred from cane lands on the northern wet tropical coast, where cases of erosive flooding were also recorded. The general incidence of soil erosion along the rest of the coast was low. Soil losses of 200 t/ha were recorded from a severe local storm on tobacco soils in the Dimbulah area.

Adoption of soil conservation measures

Soil conservation officers designed and surveyed soil conservation measures (contour banks, waterways and strip cropping layouts) on 71 000 ha of cropping land. This was an 11% increase on 1983-84. A much higher implementation rate in the extensive cropping lands resulted from favourable conditions for contour-bank construction, additional staff and improved equipment.

The depressed state of the sugar-cane industry resulted in a further downturn in measures being implemented in the cane lands.

Interest in conservation cropping has grown because of the present economic conditions, especially in sugar-cane. Landholders are using these techniques to reduce production costs and increase yields. About 25% of Mackay cane growers had adopted minimum-tillage practices, and about 40 000 ha of extensive croplands in central Queensland were treated with herbicides to reduce tillage operations.

Poor economic conditions, coupled with worsening dry conditions in the latter half of the year, were contributing to a general downturn in demand for soil conservation services.

Soil conservation farm plans present basic land-resource and soil conservation information and provide a suitable base for other DPI branches to make management recommendations. About 390 were prepared in 1984-85.

Landholder and community involvement

Landholder requests for soil conservation services remained high at 3700; and 390 landholders implemented soil conservation measures for the first time. Cooperators from the canegrowing areas markedly declined, but interest increased among tea, coffee and banana growers in far north Queensland. Of all landholders affected by soil erosion, 50% are now cooperators.

Liaison with local authorities, State government departments and landholder committees resulted in several long-standing problems involving soil conservation structure coordination being resolved or partially resolved.

Extension

The extension programme concentrated in particular on conservation cropping practices, waterway stability and maintenance of structures.

Conservation cropping demonstration plots were established in grain- and cane-growing areas and a series of field days were well attended and well received by landholders. In the Dawson-Callide area, two farmer groups were established to stimulate the adoption of conservation tillage practices.

A competition entitled 'Soil Conservation and Me' was held at the Bundaberg and Maryborough shows with outside sponsorship. Winning entries were well presented and included original art work on soil conservation. A video on how to build contour banks with a farm tractor or small dozer was completed, and a series of posters, booklets and soil conservation games generated interest among Queensland's youth.

Enhanced services

Funding from the National Soil Conservation Program provided extra extension and advisory services in four group schemes in central and southern Queensland. Similar funding promoted community awareness of soil erosion and the need for soil conservation. The Community Employment Program, which provided surveying and drafting staff, resulted in valuable assistance to the soil conservation programme.

Technical advancements

New electronic distance measuring equipment accelerated the rate of topographic data collection and new surveying equipment doubled the rate of surveying in some areas.

A minimum tillage fertiliser applicator was developed for one-pass tillage in caneland in the Mackay district. Mackay cane farmers had built at least 200 of these implements. A green cane trash-blanket treatment at Childers was expected to outyield conventional treatment by 20 t/ha.

The Wandoan Land Management Field Manual was published and erosion survey cards were developed for field use. Gully control structures installed in a severely eroded waterway in central Queensland stabilised the waterway.

Land management research

Research projects were being conducted to study the soil properties involved in erosion and ways of controlling it. Studies were in progress in central Queensland, in the Dry Tropics, in the Maranoa and on the Darling Downs.

Darling Downs. The practice of dragging harrows behind tillage implements to flatten the soil of black cracking clays appeared unwise, unless done close to planting. Gypsum was being used increasingly to improve

A soil conservation farm plan is the topic of conversation between a DPI soil conservation officer and a landholder. These plans present basic land-resource and soil-conservation information and provide a suitable base for other DPI branches to make management recommendations.

the surface structure of soils with poor physical properties. Gypsum increases water infiltration, reduces runoff and erosion, and gives better emergence and early root development.

Results from different stubble-management practices had demonstrated clearly the role of stubble cover in erosion control. Research was focusing on the way stubble cover reduces runoff water and increases the opportunities for small storms to become effective planting rain.

The adoption of reduced tillage appeared to have increased the incidence of damage to summer-crop seedlings from insects such as wireworms, false wireworms, black field earwigs and seed-harvesting ants. Press wheels on planting machinery had been shown to help control these pests and increase crop establishment.

Nitrogen in stubble appeared to play a minor role in the nitrogen nutrition of the following wheat crop. Farmers should be able to retain their stubble without having to apply any extra fertiliser to offset microbial tie-up of nitrogen.

Maranoa. Regardless of tillage methods, 20 to 25% of rainfall between November and June ran off. Runoff occurred even when the soil was not fully wet. When fully wet the Brigalow grey clay stored 70 to 90 mm of available moisture compared with 120 to 130 mm for deep balck earths of the eastern Darling Downs. Yields comparable with those of conventional tillage practices have been achieved by chemical weed control.

Dawson-Callide. The long-term effects of clearing Brigalow forest for cropping and grazing have been investigated near Theodore since 1969. Two of the catchments have been developed for cropping and pasture. Under moderate rainfall intensities, annual runoff from these catchments was 9 to 25% higher than from the uncleared catchment and much greater in an intense storm. Sorghum yields from reduced tillage practices at Biloela were similar to or better than those obtained using conventional tillage.

Central Highlands. Sunflower crops, which provide little stubble residue, were shown to produce high runoff compared with other crops that rarely produce runoff under these conditions. Zero tillage wheat had not produced runoff for 2 years while sorghum had produced runoff only once.

Erosion in the Fairbairn Dam catchment was severe, but the delivery of sediment to the dam was lower than previously feared. Control can be achieved at low cost.

North Queensland semi-arid tropics. This project is assisted by funds from the National Soil Conservation Program. Preliminary studies showed that early December sowing of sorghum may increase cropping reliability while reducing erosion.

Sugar-cane lands. Results indicate that trash retention and/or reduced tillage have markedly reduced soil erosion in all major cane-growing districts. In addition to erosion control, adoption of conservation tillage practice in cane lands should markedly reduce production costs but not greatly affect yield.

Irrigation efficiency. Studies in the Emerald Irrigation Area have indicated that, by controlling taildrain runoff, large savings in water use are possible without decrease in yield. Crop-water-use efficiency measurements showed that the highest production per megalitre was obtained with only two or three irrigations each season. However, yields in these treatments were reduced up to 22% compared to five to seven irrigations.

Land utilisation. Indian bluegrass (*Bothriochloa pertusa*) has been a good stabilising species for a wide range of soil and climatic condition. The use of mulch or primary cover crops has markedly improved the establishment of grass cover on farm waterways, road and rail embankments, dams, drainage areas and industrial sites.

Salinity. A significant advance in ability to predict soil leaching from readily measured soil properties enabled a quantitative irrigation water-quality assessment to be developed. Many moderately saline waters previously considered unsuitable can be used effectively without causing soil degradation.

Land resource assessment

The Mackay Sugar Cane Land Suitability Study has now been published, including maps showing soils, land suitability, land use, and assigned cane lands. There is sufficient suitable unassigned land to grow an additional 39 000 ha of sugar-cane. About 1230 ha of currently assigned land are considered unsuitable for growing cane in the long term, mainly because of soil erosion potential; and a further 1400 ha are considered marginal for cane growing in the long term. The Plane Creek Sugar Cane Land Suitability Study was being prepared for publication. It identifies some 53 000 ha as being suitable for cane growing.

A soil survey and land suitability study of the Herbert River lowlands was nearing completion. It describes 41 soil types within the 174 000 ha that have been mapped.

The cooperative study with the CSIRO in the Tully-Cardwell region of the wet tropical coast progressed substantially, with some 60 000 ha of the 115 000 ha completed. Land suitability assessment was completed on a trial area of Pin Gin soils near Innisfail to determine procedures for mapping the Innisfail cane lands.

A high intensity soil survey providing detailed soils information for farm subdivision and overall layout in the Burdekin irrigation area continued with a report being prepared on the 9500 ha Leichhardt Downs area. Detailed reconnaissance of the area east of Leichhardt Downs indicated that some 1400 ha east and north-east of Sheep Camp Creek are suitable for general irrigated cropping. Soil survey was begun in the Inkerman West and Mulgrave areas, with some 450 ha and 4000 ha completed in each respectively. Land and soil limitations and specific management requirements were identified.

Mapping of the land resources for 820 000 ha in the Central Burnett Region was completed and progress was made in the Coastal Burnett Region. Data was being collected in a form for use in shire planning as well as in providing basic resource data.

Erosion in action. This blacksoil waterway on the Darling Downs may be totally destroyed in a couple of years if the gully head is not fixed immediately. DPI soil conservation officers advise that regular fertiliser applications will replace patchy annual weeds with a dense grass cover to protect waterways from this type of erosion.

Low-to-medium-intensity soil surveys continued in the South Burnett red soils and the Lockyer Valley alluvia studies. Three new surveys began. One will map the soils and determine management requirements for the Roma 1:100 000 sheet area—an area of expanding agricultural development. Two others in areas of expanding dryland agriculture in central Queensland and the dry tropics were made possible by National Soil Conservation Program funds. Field work was well advanced in the central Queensland project, with some 280 site inspections completed.

***The Australian** Soil and Land Survey Field Handbook* was published last year and was adopted as the standard for soil and resource survey. A chapter on soil survey specifications was written for the *Handbook*.

Evaluation and planning

Investigation of the irrigation potential of lands downstream of the proposed Teviot Brook Dam were completed. Some 4000 ha were considered suitable for irrigation. A 1:50 000 soil survey and an assessment of land suitability for irrigation were completed for an area upstream of Ceratodus on the Burnett River. Much of the alluvia in the area has irrigation potential. Additional survey work was completed to define lands suitable for irrigation in the Maryborough irrigation area.

An evaluation of dry-land cropping potential in the Nebo-Collinsville region was completed at the Lands Department's request. The published report and maps indicate that rain-grown cropping has little potential as a sole enterprise in the region, although a substantial potential exists for rain-grown cropping as an adjunct to beef-cattle grazing. Much of the region was considered suitable for grazing of native pastures only.

The Land Management Field Manual for Wandoan district was published, while the manuals for Roma, South East Downs and Goondiwindi were almost complete. These manuals provide a suitable resource base for farm planning, specifications for runoff control structures, the limitations and management of the soil resource, and suitable conservation management systems.

Local authorities, as an aid to shire planning, continued to request land-resource data to help identify valuable agricultural lands. Projects were completed for Mareeba, Sarina, Woocoo, Mirani, Caboolture and Mulgrave shires and were in progress for Hervey Bay, Taroom and Herberton shires. A high demand continued from local authorities and the Local Government Department for land suitability assessment on land subject to re-zoning application for subdivision.

Rural tree decline was studied in the Mary Valley in a joint project with the Forestry Department. Investigations indicate that severity of dieback of Casuarina and Eucalyptus species is correlated with severity of stream salinity. The effect of tree clearing in the catchment on stream salinity and dieback was being studied in detail.

Salinity investigation continued to be a high priority. Additional monitoring was carried out in the Rockhampton, Bremer-Lockyer, Darling Downs, Biloela, Bundaberg and Maryborough areas. Information on local preventative measures was being disseminated.

Data storage and retrieval for resource survey and mapping are a priority computing area. An officer received specialist training in computer-assisted drafting from the State Government Computer Centre, and drafting activities were being enhanced by a staff interchange with the Department of Scientific and Industrial Research in New Zealand.

Agricultural chemistry

A sunflower oil micro-analysis technique was developed to analyse for linoleic acid in non-embryo sections of individual seeds. Embryo sections were subsequently germinated and used in a breeding programme aimed at producing commercial sunflower with higher linoleic acid (polyunsaturated oil) content.

Rubidium analysis has provided a means of studying the migration habits of *Heliothis* moths. The moths are fed on a diet containing salt of rubidium, a non-toxic rare metal, and then released. Migration habits can be determined by trapping individual moths and measuring their rubidium content.

Soil nitrogen measurements showed that 70% of nitrogen fertiliser applied to winter rice at planting was lost in the 15 days between planting and permanent flood. This explains why nitrogen applied at permanent flood produces the highest yields.

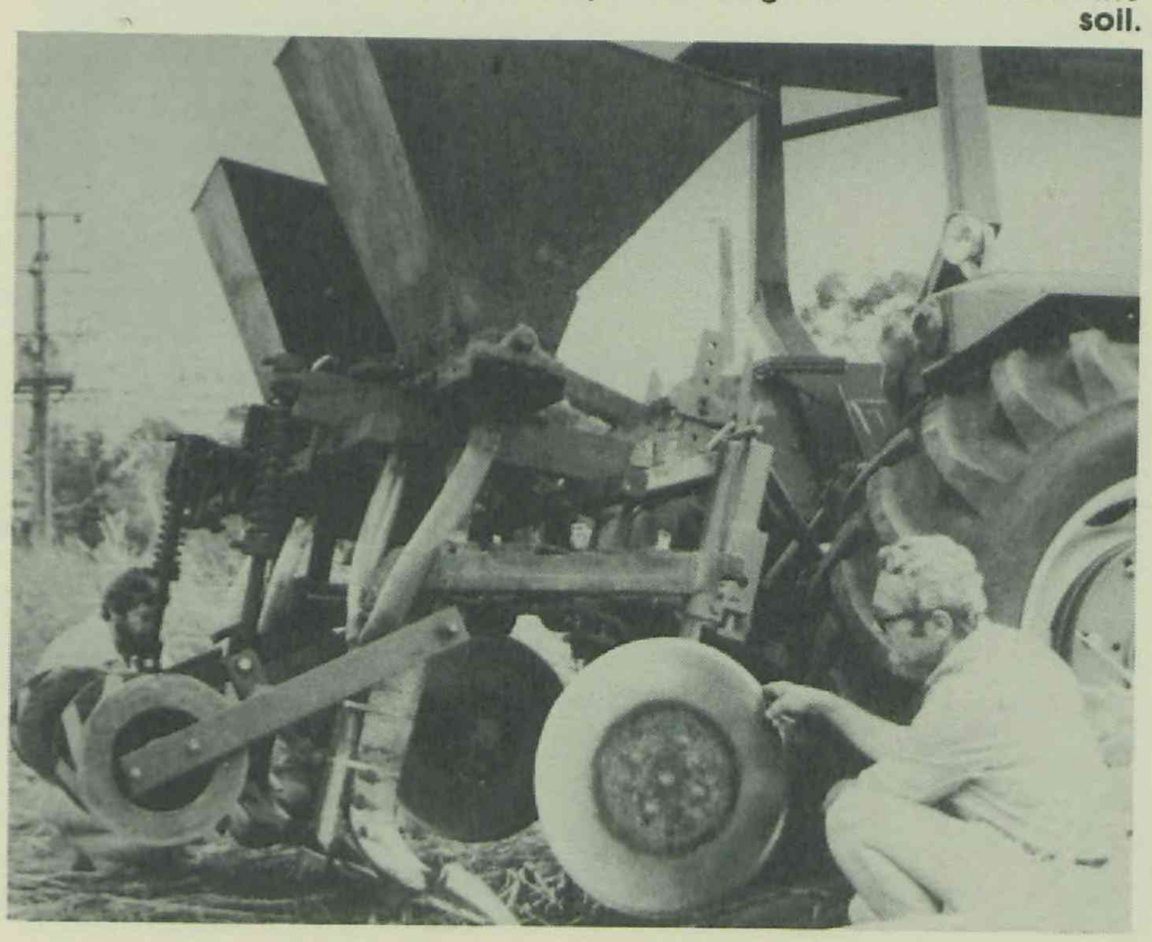
Soil fertility decline, caused by continuous cropping, were measured on six major grain-growing soils of southern Queensland. Losses of soil organic matter, an indicator of overall soil fertility, after 25 years of cropping, varied from 30 to 60% and were associated with significant yield declines.

Soil chemical and physical analyses are done to better characterise Queensland soils. Selected segments of soil profiles are sampled separately, usually to about 1.5 m. Analyses provide information on clay, silt and sand content, moisture characteristics, tendency to disperse, acidity, salinity, chemical fertility and ion exchange characteristics.

Amylose content of rice grain is an important aspect of rice quality. An auto-analyser method for rapid screening for plant-breeding purposes was developed. Amylose contents from the winter 1983 rice variety trials ranged from 20.4 to 33.7%; the summer 1984 trials ranged from 20.9 to 32.3%. The Queensland rice industry is aiming for an amylose content of about 25 to 29% to suit its market requirements.

Ethylene dibromide (EDB) may have contaminated groundwater after soil fumigation. Bore waters in pineapple- and tobacco-growing districts were analysed for EDB. An extremely sensitive method was developed, able to detect EDB at 1 part in 100 billion of water. Most of the samples contained no detectable EDB; but EDB was found in one case in which it had been used recently and in another case in which it had been spilled near a bore.

This DPI-designed fertiliser applicator successfully works through the high volume of sugar-cane trash resulting from green-cane harvesting. About 200 Mackay canegrowers have adapted fertiliser applicators to handle trash cover on their farms. Canegrowers throughout Queensland are showing great interest in trash retention to reduce farm operating costs and soil erosion. This technology can also help increase crop yields by increasing stored moisture in the soil.



FISHERIES HIGHLIGHTS

Crab research

The sand crab is one of Queensland's most important fisheries products. In southern Queensland, commercial crab-pot fishermen, prawn trawlers and recreational fishermen exploit the sand crab heavily. An intensive study of the Moreton Bay sand-crab fishery began. Field sampling, a log-book programme and tagging experiments were initiated and 2200 tagged crabs were released. The results will help in assessing conflicts between users of this resource.

Coconut crabs are large edible land crabs found in islands of the Pacific and Indian oceans. Over-exploitation is threatening the value of this resource to island communities. A joint study with the University of Queensland, funded by the Australian Centre for International Agricultural Research, began on the growth and biology of coconut crabs in Vanuatu. The findings will provide a basis for informed management of the species in many island countries.

Beam trawling

A study of the impact of estuarine beam trawling, on both otter trawl and recreational fisheries within - Moreton Bay, was completed. The river beam-trawling industry in this area was found to be very efficient, with minimal effects on recreational fisheries. A study of the relative significance of rivers compared with bay foreshores as nursery grounds for bay prawns (*Metapenaeus bennettae*) was needed before the impact of trawling in rivers on prawn stocks in Moreton Bay could be determined.

Aquaculture

A preliminary study of the aquaculture potential of a north Queensland freshwater crayfish species (*Cherax quadricarinatus*) was started. Juveniles were successfully reared. The farming of this species may be an attractive alternative to marron, particularly in northern Queensland.

Construction of a new aquaculture centre on Bribie Island began. It will have a hatchery, algal rearing facilities and nursery ponds, and be used to investigate the rearing of juvenile prawns for stocking into prawn farms. With access to good-quality seawater and freshwater, the centre will ultimately allow research on the culture of marine and freshwater species.

Prawn farming

During two study tours, DPI officers investigated prawn farming in Taiwan, the Philippines and Japan. Prawn-farming technology in these countries is highly developed. The officers noted much overseas interest in taking part in prawn-farming ventures in Queensland, where conditions are highly conducive to such as industry.

Ciguatera research

Ciguatera fish poisoning greatly concerns the fishing industry. A study of the distribution of the causative algae *Gambierdiscus toxicus* along the Queensland coast was completed. An investigation of the effects of reef disturbance from harbour dredging on ciguatera was also finalised. The studies showed that blooms of the causative organism are infrequent and confined to discrete areas, explaining the sporadic occurrence of toxic fish.

Tuna longlining

Potential for developing a longline fishery for tuna to export to the lucrative Japanese sashimi market was assessed through exploratory fishing in north and south Queensland. Initial catches were disappointing and work will continue to refine fishing techniques.

Gear technology

Several otter-board designs were tested as part of a research programme on fishing-gear technology. Construction was done early in 1985 and sea trials were completed in May. Preliminary results indicated that the new curved boards outperformed the standard boards in catch per litre of fuel burned. A trial was done on a United States-designed trash-exclusion device. Preliminary results showed that the device was difficult to deploy and did not significantly reduce the quantity of trash in the prawn catch.

Gwendoline May

The fisheries research vessel *Gwendoline May* was stationed in Cairns during 1984-85. Work commitments were intensive and included regular monthly sampling of red spot king prawns off Townsville, assessment of the east-coast prawn closure between Cairns and Princess Charlotte Bay, work on tuna, fishing-gear development and prawn behaviour. A Furuno colour sonar, fitted for near-reef work, performed very well.

A female leader prawn (*Penaeus monodon*) gets the full attention of these DPI fisheries biologists, at the Southern Fisheries Research Centre, Deception Bay. This prawn species is farmed widely in South-East Asia and will be the one of the first reared in the DPI's prawn-farming programme.

Demersal fisheries

Coral reef fishes such as red emperor, large mouth nannygai, spangled emperor and coral trout continued to be studied. Preliminary estimates of longevity, and of age at length and maturity were obtained. This knowledge is essential to understand the present mortality rates of the major species within the inter-reef fishery.

Strong prevailing currents hindered exploratory dropline fishing, between 100 and 150 fathoms off Cairns.

North Queensland tuna

Sashimi-grade tuna were studied in a cooperative programme with the DPI's food research branch. Extremely bad weather during the full-moon periods of October and November 1984 hampered a study of the tuna resource. Japanese radio report data indicated that the bulk of the 1984 season handline catch of 232 t was taken over an 8- tc 10-day period in the above-mentioned months. This catch was substantially down on that of previous years (35% and 24% of the 1983 and 1982 catches respectively).

Shark

A pelagic fish resource survey of the eastern Gulf of Carpentaria was conducted jointly by fisheries research organisations during the winter months of July and August 1984. Shark catches were found to be patchy. In the southern Gulf, good catches of *Carcharhinus limbatus* and *C. sorrah* were taken around the 12-fathom contour. Shark catches taken in the northern Gulf were disappointing.

The survey identified an unfished troll-fishing resource of Spanish mackerel and highlighted the applicability of small, low-cost, shallow-water, fish-aggregation devices (FADS) to attrach mobile shoals of these species.

Juvenile prawns

Juvenile prawns were studied around the Wellesley Islands in the Gulf of Carpentaria. The results obtained on the timing of the juvenile phase of the brown tiger, endeavour, and western king prawn life cycles were presented at the Second National Prawn Seminar in October 1984. Their life cycles are completed in a year, with spawning taking place in late autumn. Juveniles were found to enter commercial fishing grounds between November and March. These results were used to establish seasonal closures designed to reduce juvenile prawn capture.

Prawns—seagrass nursery grounds

Coastal seagrass beds that form nursery grounds for juvenile commercial prawn species were mapped in east-coast areas between Cape York and Cape Grafton, in November 1984. Nine species of seagrass were found, all in depths less than 15 m. Four of these species commonly supported large populations of juvenile commercial-prawn species. The largest beds of seagrass found were close to Princess Charlotte Bay. Seagrass prawn nursery grounds covered only a small proportion of the inshore habitat.

Adult prawns

Commercial prawn resources in the south-east Gulf of Carpentaria were found to undergo changes in species and size composition between sample sites and from month to month. Differences in the catchability between species, and during the day-night period were documented. The timing of the life history of tiger and endeavour prawns was described. Information from this project has already been used to help manage the northern prawn fishery.

Commercial prawn catches were monitored to assess the effectiveness of the January-February 1985 closure of the north-eastern Queensland coast. Changes in the number and weight of prawns were monitored using trawl samples collected by the *Gwendoline May*. During the closure the weight of brown tiger prawns, the most valuable commercial species, more than doubled and increases were evident for other commercial species. The monitoring programme provided results that helped the industry assess the value of the closure.

A major study of prawn fisheries near Townsville, between 18°S and 20°S, began. It focused on the life history and population dynamics of the red spot and blue leg king prawns. The species supported a valuable near-reef fishery, between Lucinda and Bowen, which showed much variability in landings, of between 200 and 700 t/year, between 1982 and 1984.

Studies on distribution, reproductive cycle, growth rates and movements were underway. Data on distribution were being obtained from monthly sampling trips both in estuarine and offshore areas.

Simultaneously, a descriptive study of by-catch in the fishery was begun to determine the impact of trawling within the Great Barrier Reef Marine Park.

A fisheries development project, based upon low-technology beam-trawl operations, was carried out at Daru in collaboration with Papua New Guinea fisheries personnel. Beam-trawl gear was adapted for trawling behind local sail-powered dug-out canoes and good catches of banana prawns were taken. This adaption of local equipment showed much promise for future development projects.

University students from Papua New Guinea get work experience and training in gear technology at the DPI's Southern Fisheries Research Centre, Deception Bay, under the watchful eye of Mr Phil Smith, master of the DPI research vessel, *Bar-ea-Mul*.

Gill net fisheries

Gill net fishery resources were surveyed in the south-eastern Gulf and the north-east Peninsula coast. Analyses were well advanced for data on the sexuality, seasonality, stock identity and fishery statistics of the major target species, especially barramundi and threadfin salmon.

As part of the east-coast gill-net fishery assessment that began in 1981, staff at the DPI Fisheries Research Station, Burnett Heads, completed a series of surveys in the central Queensland coast area in October 1984. Data were collected on the general biology of barramundi and other target species, catch-effort in the commercial fishery, and gear selectivity. Analyses of these data were progressing and a final report was expected in September 1985.

Freshwater fisheries

Native freshwater fish research included the successful barramundi pilot-hatchery programme, carried out by staff of the Northern Fisheries Research Centre, Cairns, and Walkamin Research Station, near Mareeba. Eggs from wild barramundi captured at spawning grounds near Weipa were successfully fertilised and flown to Cairns for hatching. Larvae were successfully reared to juvenile stage and transferred to Walkamin Research Station, where they were being maintained for use as future brood fish.

Separate stocks of broodfish were captured from near Weipa and Cairns, and these were being maintained in tanks at the Northern Fisheries Research Centre for use in spawning trials in summer 1985.

A one-year study on reproduction of jungle perch was concluded and provided evidence that this important sport fish spawns in a marine environment. Hatchery production was continued, and 95 000 fingerlings of sooty grunter and silver perch were stocked to Boondooma, Eungella, Kinchant and Moondarra dams.

Nile perch

The Nile Perch programme had difficulties finding a fingerling supply source in Africa. Agencies in Kenya and Nigeria were approached, but it seemed that the fish would have to be captured from Lake Victoria, in Kenya.

About 1400 fingerlings are required. The Commonwealth Department of Health would test most of these for diseases. Because of the disease-testing laboratory's commitments, importation would not occur until the latter half of 1986.

Fisheries reserves

Fisheries purpose reserves were defined between St Lawrence and Proserpine and in the Hervey Bay region. When approved, these reserves will complete the protection, on the Queensland east coast, of most of the undisturbed mangrove areas and the most extensive seagrass areas identified to date.

Fisheries reserves do not restrict commercial or recreational fishing, but protect important spawning, breeding and feeding habitat against development that might harm the fishery. Similar controls on mangrove and saltmarsh areas are applied through the issue of specific permits.

Coomera Island study

Studies indicate that available chemicals can be toxic to juvenile stages of fish. Saltmarsh habitat modification showed promise as an effective mosquito-control method for waterfront suburbs of south-east Queensland. This project, involving the DPI, the Department of Health and Griffith University, showed that a trenching programme, which allows pools in the saltmarsh area to have constant access to tidal influence, can significantly reduce the saltwater mosquito-breeding habit. It also gives fish improved access to feeding areas during spring tides. The concept will be investigated further.

Marketing returns

Queensland seafood wholesalers are required under the *Fishing Industry Organization and Marketing Act* 1982-83 to complete a monthly return summarising fish bought from Queensland fishermen. The DPI is developing this programme on behalf of the Queensland Fish Management Authority and is providing an extension service to any firm needing help to complete the return. The data obtained from these returns will provide a basis for managing Queensland fisheries.

Scallop study

A minimum shell size of 80 mm was defined in regulations in 1984 to protect the saucer-scallop resource, particularly throughout its winter-spawning period. Industry had extensively requested this protection.

An inspection programme using DPI staff and the Queensland Boating and Fisheries Patrol was undertaken from December to February. More than 7000 baskets of scallops were sampled and measured to determine the shell size being harvested. Only 1% of scallops were found to be under 80 mm in size. Scallop-meat recovery counts of 60 to 100/kg were recorded. A winter-sampling programme had begun to assess these factors in the scallop off-season.

DPI sand-crab-project team members tag sand crabs for a tank study of the effects of tags on crab survival. The DPI released 2200 tagged sand crabs as part of an intensive study of the Moreton Bay sand-crab fishery to investigate claims of overfishing.

Sand crab survey

State Cabinet directed the DPI, in conjunction with other agencies, to monitor the effects of coral dredging in Moreton Bay. As a part of this project, the DPI carried out boat-ramp surveys of recreational sand crabbers, from November 1984 to March 1985, in southern Moreton Bay. Of the 380 boat owners interviewed, most thought that catches were down on past years, due mainly to too many crabbers and the pastime's increased popularity. Average recorded catches were about 4 crabs/person. Of the 3000 sand crabs measured in the survey, 58% were over the legal 15 cm carapace width.

Oyster survey

An economic survey of oyster-licence holders in southern Queensland showed that 71% operate only one oyster bank and had a median gross income of less than $2000/bank for the survey period. The top six operators averaged $30,000/bank. The DPI was studying the Queensland oyster market's structure and organisation.

Tuna project

The DPI continued to investigate ways of improving the Queensland tuna fishery. Northern bluefin tuna samples were test-marketed in Japan to assess market potential and procedures for capture, handling, chilling and transport.

Departmental officers organised and presented training programmes for local fishermen interested in tuna fishing, and cooperated closely with fishermen in fishing trials.

Prawn closures

A closure on the taking of prawns was introduced in north Queensland during January-February 1985. Seminars were arranged with industry to discuss the issues involved. The results of these discussions were documented, and a post-closure review was being prepared for industry dissemination.

Inspection service

The DPI established a small fisheries inspection group to support Queensland Fish Management Authority activities that the traditional fishing inspectorate, maintained by the Department of Harbours and Marine, is unable to service. The group was looking at activities in the industry's marketing sector.

Extension

A bass fishing documentary film and video was produced. The 8-minute documentary deals with recent DPI and Queensland Fish Management Authority legislative action to manage and promote the recreational bass fishery in the Noosa River system of south-east Queensland.

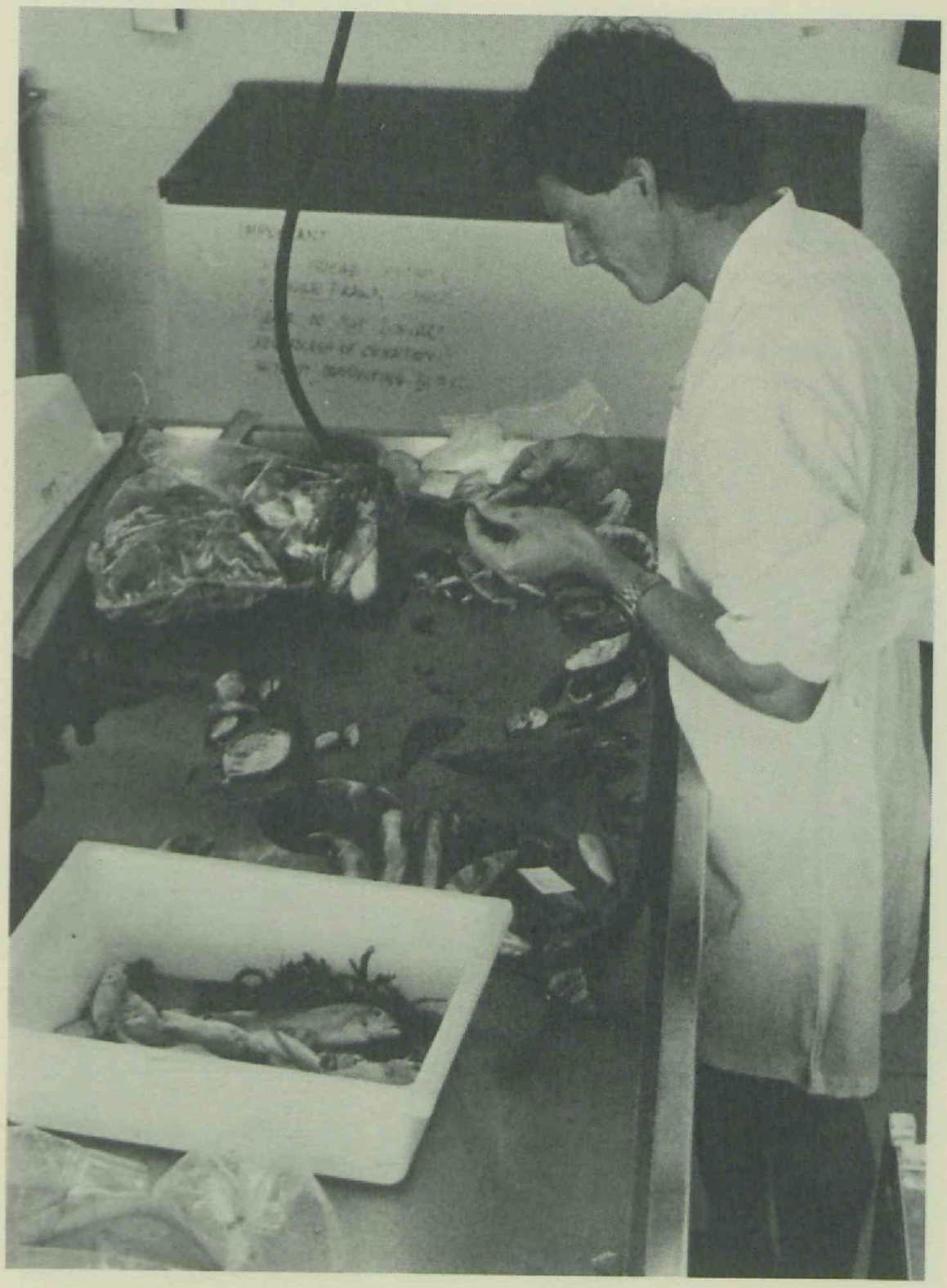
QFMA Fishing Sector Advisory Committee

The QFMA Fishing Sector Advisory Committee was established as a sub-committee of the Queensland Fish Management Authority in November 1984. The committee reviews fishing sector issues submitted for Authority decisions and recommends to the Authority.

Recreational Fishing Advisory Committee

This committee provides the forum for ministerial advice on issues of specific concern to recreational anglers and maintains a balance, between recreational and commercial fishermen, in industry input into the management process. Legislation about barramundi bag limits and protection of Australian bass from commercial exploitation directly resulted from this committee's activities.

A technician at the DPI's Northern Fisheries Research Centre, Cairns, sorts through a trawl sample from the red-spot king-prawn by-catch project to determine the impact of trawling within the Great Barrier Reef Marine Park.



MARKETING AND ECONOMICS HIGHLIGHTS

Wheat and sugar reviews

A Sugar Industry Working Party and a Wheat Marketing Review Committee were established (see page 4).

Trade development section

A trade development section was formed within the DPI's marketing services branch and played an important role in Queensland's successful participation in AgAsia '84, an agricultural exhibition held in Kuala Lumpur, Malaysia. Using the theme, 'Queensland—Australia's State of Tropical Agriculture', the State's display and associated technical seminars highlighted Queensland's importance and relevance as a supplier of goods and technology to the tropical world. The DPI's role in pioneering advances in tropical agriculture complemented the marketing approaches of a number of private-sector exhibitors. AgAsia '84 was a major success for Queensland and, in the first year alone, generated export sales of about $5m.

Queensland, like most other exporters of agricultural products, is continually looking to enhance the quality of its exports. Aware that irradiation offers advantages such as disinfestation, reduction of harmful pathogens and extended shelf-life, the DPI's trade section, in conjunction with economic services branch, was analysing in detail the application of irradiation to specific Queensland primary products.

A high-quality publication, *Agriculture Export Queensland*, was printed to enhance Queensland's agriculture exports. Copies were distributed through the Agent-General in London, Commissions for Queensland in Bahrain and Tokyo, and Australia's Trade Commissioners.

Submissions to inquiries

Evidence was presented to IAC inquiries into the apple and pear industry and into fertiliser consumption, and also to an independent specialist inquiry into the Australian grape and wine industries.

The DPI's Apple and Pear Inquiry submission drew attention to the depressing domestic-market returns for apples destined for export but diverted to the domestic market. The DPI sought: continuation of an export-incentive scheme; the use of Tasmanian Freight Equalisation Funds for export-market development rather than encourage shipments to mainland Australia; and a re-direction of Australian Apple and Pear Corporation activities to more active involvement in export-market development.

The Grape and Wine Inquiry submission recommended abolishing the 10% sales tax on domestic wine, and introducing measures to increase research funds for viticultural research, a Plant Variety Rights scheme and measures to reduce the surplus production of sultana grapes.

PNG export tree crop study

The DPI's economic services branch, in collaboration with the Papua New Guinea Department of Primary Industry, began a 3-year study of the PNG coffee, cocoa and copra industries. The objectives of the study, funded by the Australian Centre for International Agricultural Research (ACIAR), include development and evaluation of low-cost study methods and development of a suitable analytical framework for an agro-economic study of the largeholder and smallholder/village sectors of each industry. Main activities to date had comprised developing and pre-testing questionnaires for the coffee and cocoa/copra plantation sectors, compiling a plantation listing for coffee and cocoa/copra plantations, and preparing and designing the sample.

Report on Queensland horticultural industries

During 1984 concerns about possible financial difficulties affecting many Queensland fruit-and-vegetable growers were raised by the horticulture industry. Low prices had been received for a wide range of vegetables and tomatoes during early 1984. In response, a non-extensive economic survey of Queensland was conducted. The report confirmed that the profile of the horticultural industry had altered in recent years, with significant changes in crop varieties, grower numbers, production areas, average yields, production levels, and growing districts.

Financial counselling

A team of agricultural economists based at Townsville, at Mareeba and in western Queensland gave financial counselling to graziers affected by the brucellosis and tuberculosis eradication campaign. The team developed a computerised budgeting model that was used in on-property financial counselling. The model permitted assessment of cash flow and profitability implications of alternative management and destocking strategies that formed the basis of the individual property eradication programmes.

DPI marketing officers prepared information materials for the DPI's role in Queensland's highly successful participation in AgAsia '84, an agricultural exhibition held in Kuala Lumpur. The DPI's exhibit, depicting its role in pioneering advances in tropical agriculture, complemented the marketing approaches of private-sector exhibitors.

Industry studies

DPI agricultural economists maintained close involvement with several industry studies during the year. They conducted cost-of-production surveys in the broiler and egg industries and monitored all recommended pricing changes in the bread industry. Economic services branch continued its contribution to assessing cost movements in the farm sector of the tobacco industry.

Burnett primary industries

An agricultural economist at Bundaberg completed an analysis of primary industries in the Burnett. The report detailed the contribution of each primary industry to the region's economy and highlighted the changing relative importance of the local sugar and horticultural industries.

Farm Management Handbook

Sales of more than 1500 copies of the *Farm Management Handbook* during 1984 indicated the continuing popularity of this rural reference book. The DPI's economic services branch has the main responsibility for updating the *Handbook*; financial and other short-term data in Part B were updated for 1985.

Off-farm investment seminar

An off-farm investment seminar at Roma was one of the many training events that economic services branch officers conducted for farmers and agribusiness. The seminar brought together DPI speakers and commercial investment advisers in a programme designed to stimulate interest in off-farm investment as a management tool in primary production and to explain some of the options available for short-, medium- and long-term investment.

Microcomputer book

A major contribution to microcomputing in agriculture was made with the production of the book, *A Primary Producer's Guide to Microcomputing*. The book is a comprehensive guide to computing aspects that concern primary producers and provides valuable resource material for workshops. About 400 copies had sold since its release in October.

Reducing spray drift damage

In July 1984 new regulations were introduced requiring smoke generators be fitted to aircraft spraying in hazardous areas. The generators will give pilots wind-speed and direction guidance, and are expected to reduce the risk of crop damage.

Further changes to agricultural chemical control legislation were proposed after an investigation of legislative control systems in the United States.

Complaints by landholders about crop damage from spray drift were investigated, and reports were issued for growers to use in seeking redress for spray-drift damage.

Seed standards

Consumers will benefit from new seed standards requiring all seed be labelled with a quality description, before sale. The new regulations, similar to those in other States, were to come into effect on December 1985. Consumers will be provided with data on important factors of quality, particularly germination percentage, of bought seed. Under the new regulations, the present system of minimum standards will be maintained, thus providing additional protection.

Extension activities, designed to gain a high level of compliance by making industry aware of the requirements of legislation, also were given high priority. A 120-page seed-training book, *Seed Processing in Australia*, written for the 1984 international course in tropical pasture and fodder seed production, was being enlarged. It will be made available to industry as a DPI saleable title.

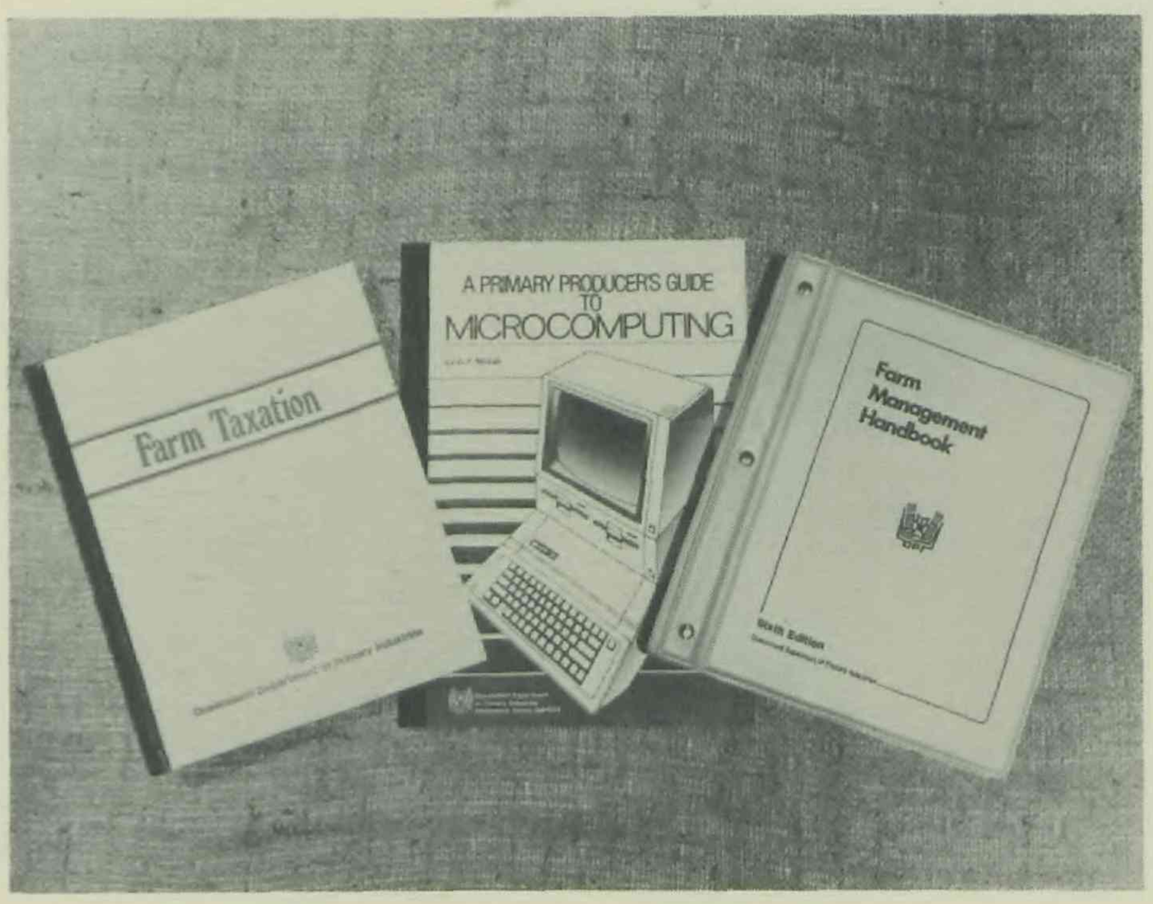
Fruit and Vegetables Act Review

During 1985 and 1986, the Act was to be reviewed in collaboration with industry. The review will focus on controls over minimum standards and on features that the buyer does not readily discern. In recent years market surveillance has placed greater importance on these aspects (for example, fruit maturity testing).

The number of fruit samples analysed in the Brisbane Markets over the last 2 years has increased three fold compared with the number analysed in the early 1980s. Emphasis in 1984-85 was on grapes, after introduction of a new minimum standard for the sultana variety, and on avocados. This can only benefit these industries at a time of increasing production and market competition.

The DPI's standards branch was helping to develop and better define a set of Australian grade standards to facilitate trade by description.

These management books from the DPI's range of saleable titles are extremely popular with primary producers and their professional advisers, and are used in schools and colleges as texts and for reference.



Export grain, plants and plant products

A record number of shipments were made and a record quantity of coarse grains exported from Queensland. A total of 165 ships and 3 109 932 t of wheat, barley and sorghum were inspected at the loading ports of Pinkenba, Gladstone and Mackay. This compares with the previous record of 2 069 879 t and 144 ships in the 12 months to 30 April 1980. This record can be attributed to big increases in barley (581 982 t) and sorghum (1 482 139 t). Wheat exports of 1 045 811 t were slightly below the previous best effort of 1 189 512 t in 1979-80.

The 76 286 t of wheat and sorghum inspected in Mackay were the first significant shipments from this port. Loading facilities at Gladstone were increased from 350 to 1200 t/hour. This will greatly reduce turn-around time for shipping and increase grain exports through the Capricornia Region. The new terminal at Fisherman Islands was well advanced and should be operational for the 1985-86 crop. This will allow larger bulk ships to visit the Port of Brisbane.

Other plants and plant products, which under the *Export Control Act* 1982 are only inspected when exported to countries requiring Phytosanitary Certification, continued to place heavy demands on inspecting activities on the Darling Downs and in the Capricornia Region as well as in Brisbane.

Export fruit and vegetables

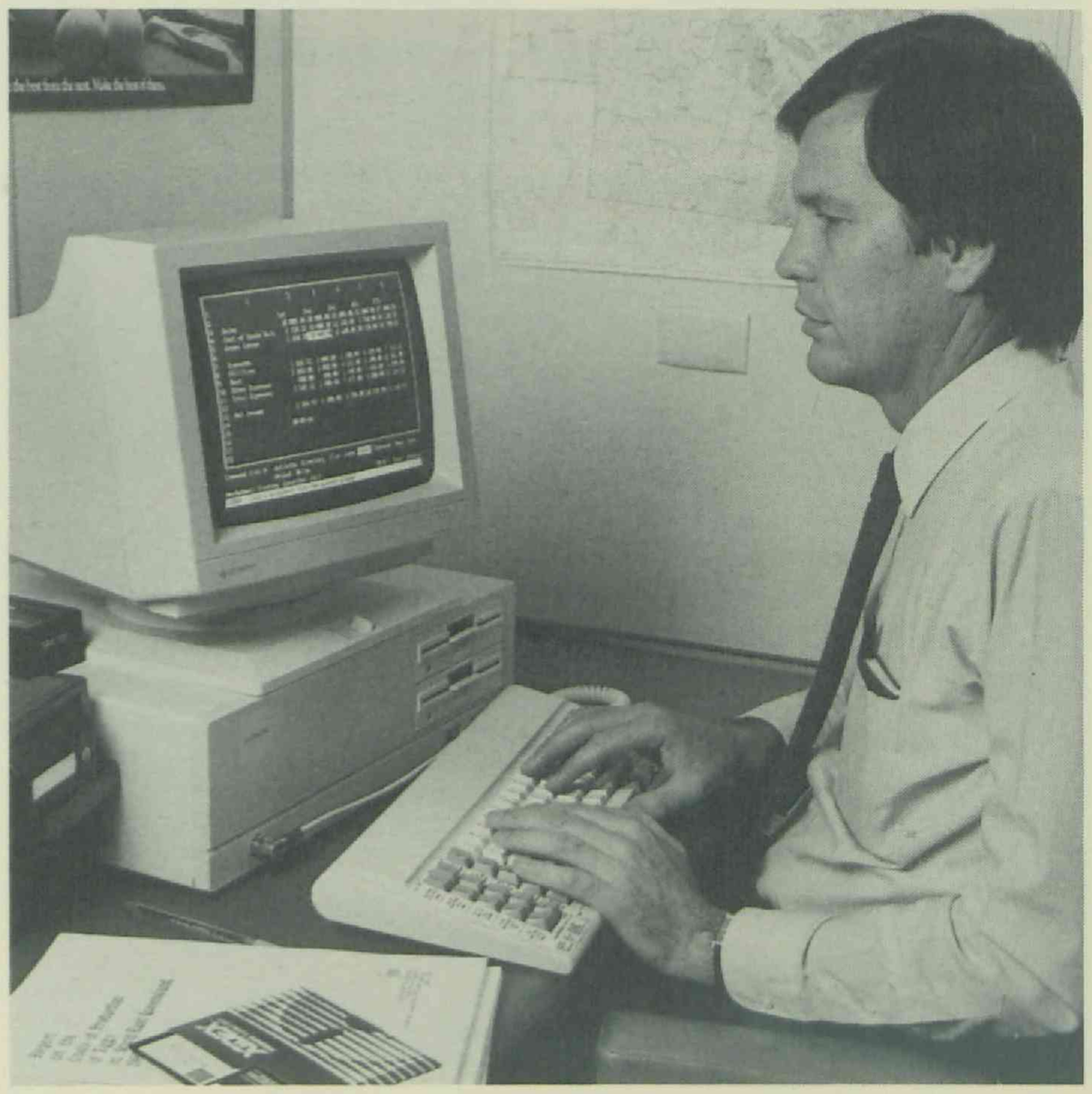
Orange exports to Japan from the Central Burnett district increased: in September 1984, 32 containers of Valencias were shipped to Japan; and 20 containers of Navels were on order for May 1985. Queensland initiatives in opening this market are expected to enhance the more general export prospects for Australian citrus fruit.

Apart from the strict Japanese inspection procedures, the oranges had to meet extremely low tolerances for residues of ethylene dibromide used as a fumigant for fruit sterilisation. Work was being done with cold sterilisation as an alternative treatment. In the longer term, ionising irradiation may be an acceptable alternative.

Regular shipments of ice-packed broccoli (by air) and pre-cooled Chinese cabbage (by sea) were being made direct from the Lockyer Valley to Singapore and Hong Kong. Fresh ginger exports from the Near North Coast to the United Arab Emirates was expected to exceed 25 containers this year. On-farm inspections were helping the development of these markets.

Good-quality rockmelons were finding a ready market in South-East Asia. Fruit was packed in the Chinchilla district specifically for these markets.

A DPI agricultural economist uses a microcomputer to analyse survey data. Economists conduct cost-of-production surveys in the broiler and egg industries, monitor recommended pricing changes in the bread industry and assess cost movements in the farm sectors of the milk and tobacco industries.



LEGISLATION

- The *Deer Farming Act* 1985, to control deer farming in the State, was assented to on 15 April 1985. Its main provisions include: the declaring feral areas for the individual deer species found in Queensland; the annual licensing of deer farms as either feral area farms or non-feral area farms; prescribing the standard of fencing for non-feral area farms; identifying farm deer by an earmark to distinguish them from feral deer, which will remain as fauna under the *Fauna Conservation Act*; the keeping of a farm register by the licensee; and the recapture, destruction or disposal of deer that have escaped in a non-feral area for its species.

  The Act and Regulations were expected to come into effect from 1 October 1985.

- Queensland's progress in the National Brucellosis and Tuberculosis Eradication Campaign was legally recognised by Notification under the provisions of the *Stock Act* 1915-1984 declaring the whole of the State a Bovine Brucellosis Provisionally Free Area. The Regulations relevant to the Brucellosis and Tuberculosis Eradication Campaign were amended to: provide increased monetary compensation for stock destroyed or disposed of from infected properties; define, more clearly, responsibility and compensation payable where infected stock escape while being travelled to places of disposal; and provide an enlarged classification for those stock subject to compensation.

- An Order in Council under the *Stock Act* specifying lymphosarcoma to be a disease to which a warranty of freedom from such disease shall apply was gazetted.

- Orders in Council under the *Exotic Diseases in Animals Act* 1981-1982, declaring avian influenza and screw worm infestation to be exotic diseases applicable to the Commonwealth/States cost-sharing arrangements for the eradication of exotic disease, were also gazetted.

- The *Meat Industry Act* 1965-1984 was amended to give a legislative basis for appointing Commonwealth meat inspectors to perform duties for State meat-inspection purposes.

- Amendments to the *Meat Industry Regulations* 1973 were made to allow for: the abolition of meat inspection fees at export abattoirs; a uniform meat-transfer certificate and certificate of inspection; the selling of meat over the counter directly into a mall area and the removal of partitions around the pre-wrapped meat-display areas in supermarkets; and the sale of a large number of non-meat items (for example, soups, bread and knives) from butchers' shops.

- The *Primary Producers' Organisation and Marketing Act* was amended to enable the Egg Marketing Board and the Central Queensland Egg Marketing Board to offer egg producers a choice in their method of paying Board levies for administrative purposes. The amendment will enable growers to elect to pay their levies on the basis of the commodity eggs, as has been done, or, alternatively, on the basis of the number of hens included in growers' adjusted hen quota. Offering an alternative basis of levy payment will more equitably distribute industry administrative costs among egg producers and will simplify levy-collection arrangements.

- Amendments to the *Hen Quotas Act* passed in early 1985 are designed to maintain a broadly-based family-farm industry by limiting the further acquisition of egg-producing interests by already large egg producers. The amendments will allow introduction of a more flexible controlled transfer mechanism at the lower end to help in industry restructuring among smaller quota holders, while providing a more effective legislative base for enforcing existing Hen Quota Committee policies.

- The *Wheat Marketing Act* 1984 continued Queensland's participation in the national wheat-marketing arrangements for a further 5-year period. The new Act complements the Commonwealth's *Wheat Marketing Act* 1984 and also repeals the earlier State legislation on which the previous 5-year wheat-marketing arrangements had been based (*Wheat Marketing Act* 1979-1984). Safeguards have been built into the new Act to protect the State Wheat Board's traditional role in matters such as determining intake classification standards, setting premiums on wheat sold in Queensland and determining payment rates for growers of premium grade (Hard and Prime Hard) wheats.

- The *Wheat Pool Act Amendment Act* 1984 amended the *Wheat Pool Act* 1920-1983 in certain respects to complement the new *Wheat Marketing Act*, notably to allow the State Wheat Board to operate a permit system for direct sales of feed wheat from growers to end-users.

- The *Farm Produce Marketing Act* 1964-82, which replaced and amended the old *Farm Produce Agents Act*, came into effect on 1 July 1984. The new Act brought merchant transactions under its control. Merchants now must be licensed in the same way as Agents. Throughout Queensland, there could be about 150 farm produce Commercial Sellers who are expected to be licensed.

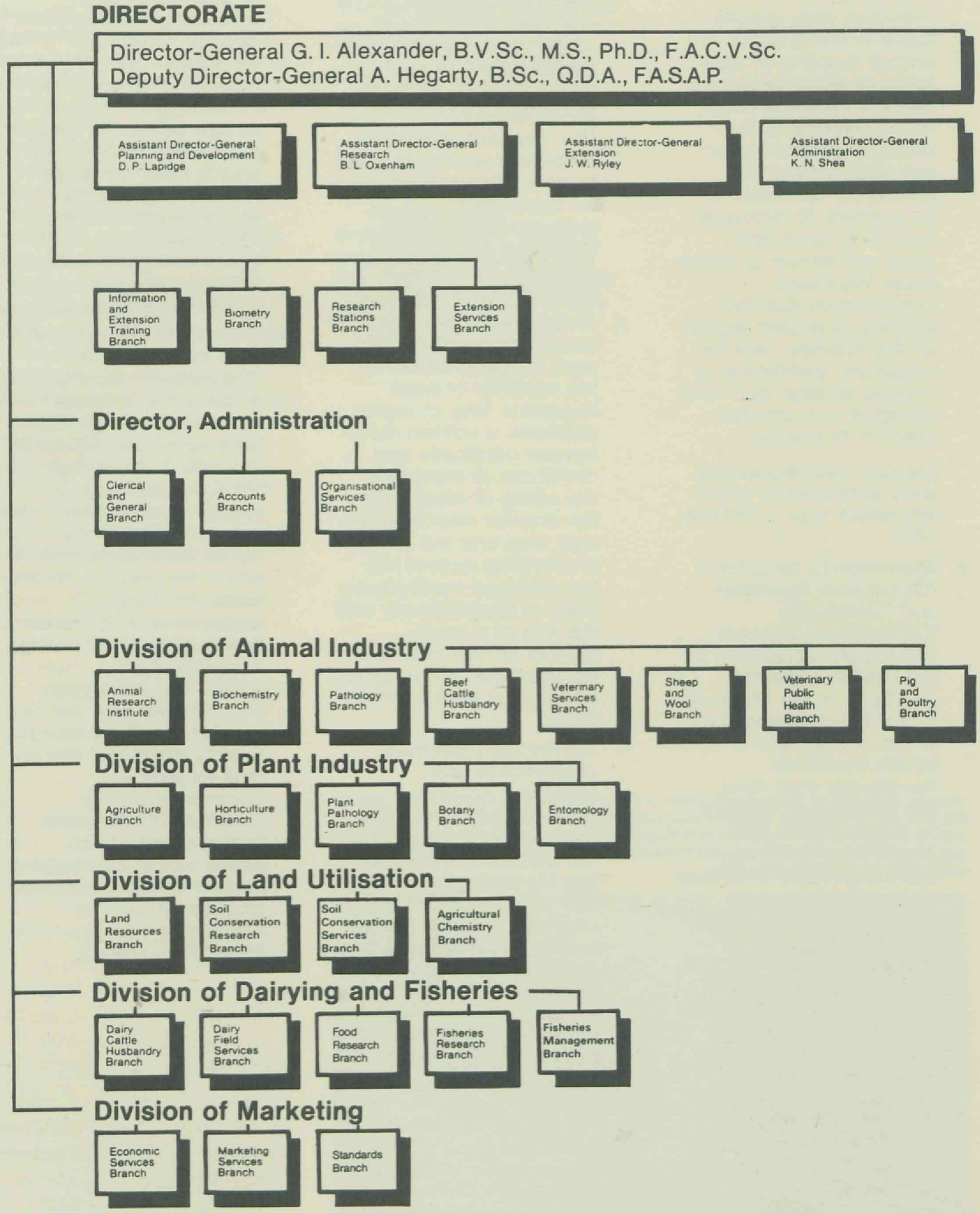
Organisation

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 DPI assisted by a deputy director-general and four assistant directors-general. Collectively called the directorate, they are responsible for planning and development, research, extension, regulation and administration.

In technical areas, responsibility for coordination and performance rests with divisional directors. They are supported by a branch structure that has senior officers at centres throughout the State. A director heads each branch within a division. The DPI has 5 divisions and 31 branches.

The DPI's approved public service staff establishment at the end of June 1984 was 2889. 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 full-time 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 the Queensland consumer by assuring the quality of rural produce.

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.

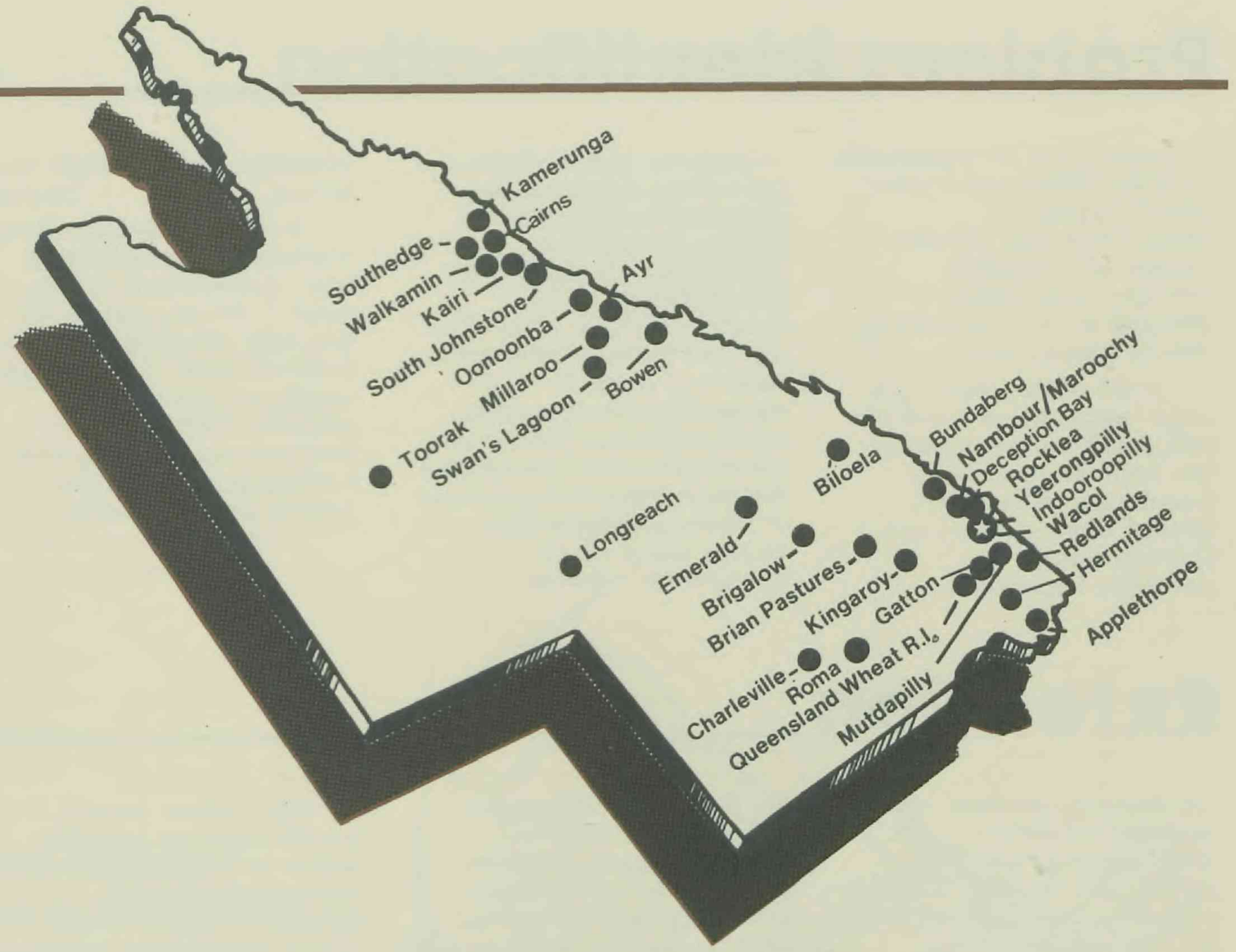
Research

Although procedures for research projects follow a common pattern throughout the DPI, they are not completely uniform due to the nature of the industries being serviced, the number of regional officers involved, and the activities of the project group (for example, production research, marketing research, conservation research).

Research is not regionalised; it is administered through branches and divisions for the Research Stations Board. However, regional groups are established within some branches and to coordinate research activities of branches working within the one industry.

Research can be categorised as:

- 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, tobacco or 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 stations

Applethorpe	**Granite Belt Horticultural Research Station**
Ayr	**Ayr Research Station**
Biloela	**Biloela Research Station**
Bowen	**Bowen Horticultural Research Station**
Bundaberg	**Bundaberg Research Station** **Fisheries Research Centre**
Cairns	**Kamerunga Horticultural Research Station** **Northern Fisheries Research Centre**
Charleville	**Charleville Pastoral Laboratory** **Croxdale Field Station**
Cleveland	**Redlands A.I. Export Centre** **Redlands Horticultural Research Station** **Redlands Poultry Research Centre**
Deception Bay	**Southern Fisheries Research Centre**
Emerald	**Emerald Research Station**
Gatton	**Gatton Research Station**
Gayndah	**Brian Pastures Pasture Research Station**
Indooroopilly	**Science Laboratory Complex**
Julia Creek	**Toorak Sheep Field Research Station**
Kairi	**Kairi Research Station**
Kingaroy	**J. Bjelke-Petersen Research Station**
Longreach	**Arid Zone Institute**
Millaroo	**Millaroo Research Station** **'Swan's Lagoon' Cattle Field Research Station**
Mutdapilly	**Mutdapilly Research Station**
Nambour	**Maroochy Horticultural Research Station**
Rocklea	**Animal Husbandry Research Farm**
Roma	**Roma Field Station**
Southedge	**Southedge Research Station**
South Johnstone	**South Johnstone Research Station**
Theodore	**Brigalow Research Station**
Toowoomba	**Queensland Wheat Research Institute**
Townsville	**Oonoonba Animal Health Station**
Wacol	**Artificial Insemination Centre** **Dairy Herd Improvement Laboratory** **Pig Research Centre** **Tick Fever Research Centre**
Walkamin	**Fisheries Research Station** **Walkamin Research Station**
Warwick	**Hermitage Research Station**
Yeerongpilly	**Animal Research Institute**

Problem identification

In general, the DPI establishes problem identification and priority setting by consultation and discussion (usually with industry), through formal groups or through ad hoc meetings to discuss specific topics.

Much of the planning is done regionally, and branch and departmental priorities are determined from the overall advice received, except where government priorities assume an overriding importance.

Industry is consulted, particularly in relation to problem identification. Industry consultative committees are associated with a number of DPI research stations, while other research stations receive the advice of industry representatives. In addition, as an example of divisional consultation, the Division of Animal Industry has a number of animal species liaison groups, designed for consultation between extension and research groups.

The DPI does longer-term planning into new fields of work, particularly into the need to develop resources and staff. DPI attendance at national review conferences, workshops and meetings helps coordinate State priorities and activities within national programmes to support the rural sector.

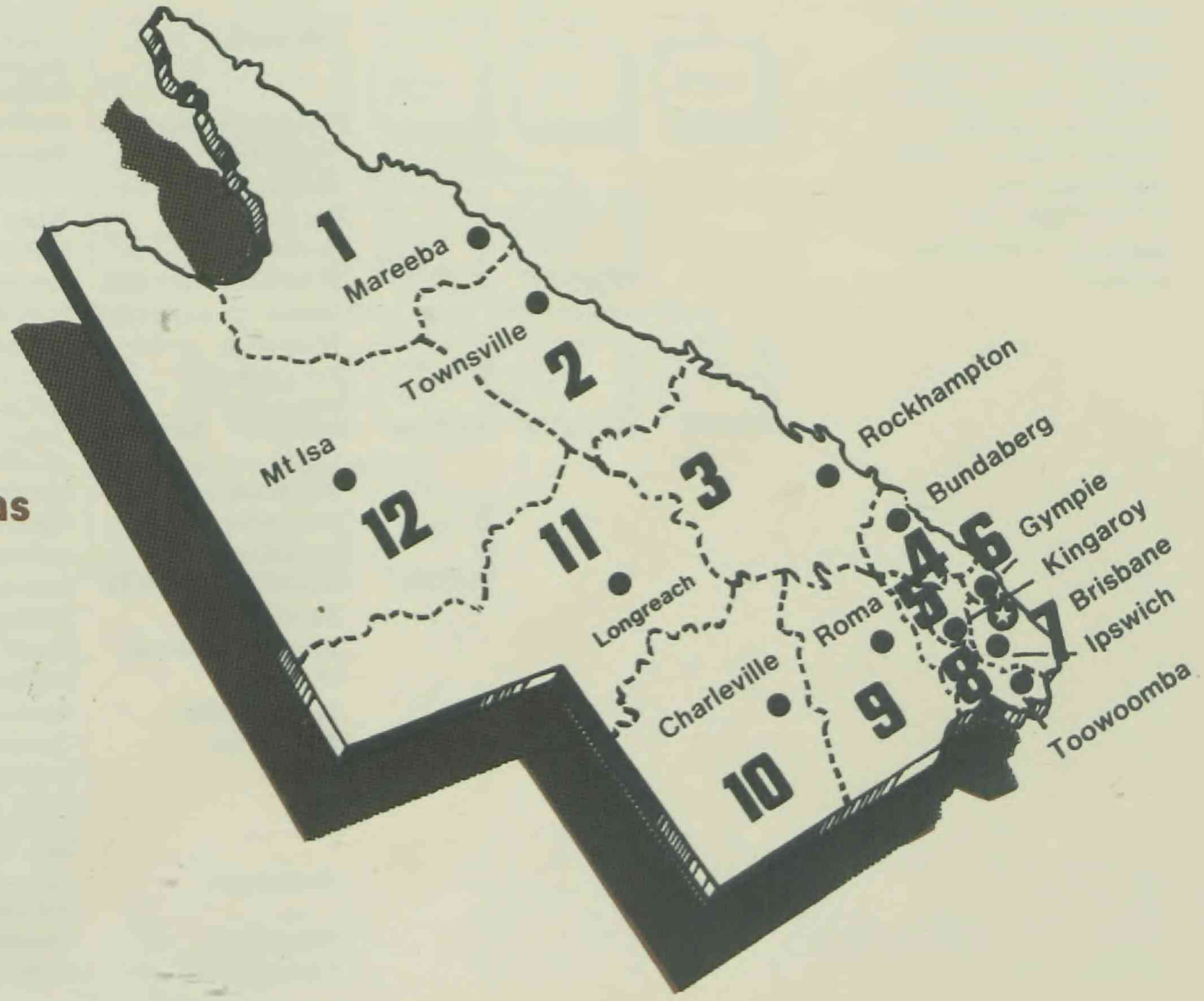
Extension

DPI extension services help Queensland primary producers improve their productivity through adopting new and improved practices, and through adapting existing resources using better methods. Extension services help keep primary production efficient, thereby ensuring better-quality and more-economical food and fibre products for all the community.

The DPI services all rural industries except timber and (for some purposes) sugar. It 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 full-time regional extension leader to coordinate, assess, develop and improve extension services to help 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

Regulation

DPI regulatory staff administer Acts for both the Queensland and Commonwealth governments. The aim is to protect both the consumer and the producer through orderly marketing, disease control and product hygiene and quality. These Acts include the *Agricultural Standards Act, Drought Relief to Primary Producers Act, Stock Act, Primary Producers' Organisation and Marketing Act, Wine Industry Act,* and *Veterinary Surgeons Board Act.* DPI regulatory activities include:

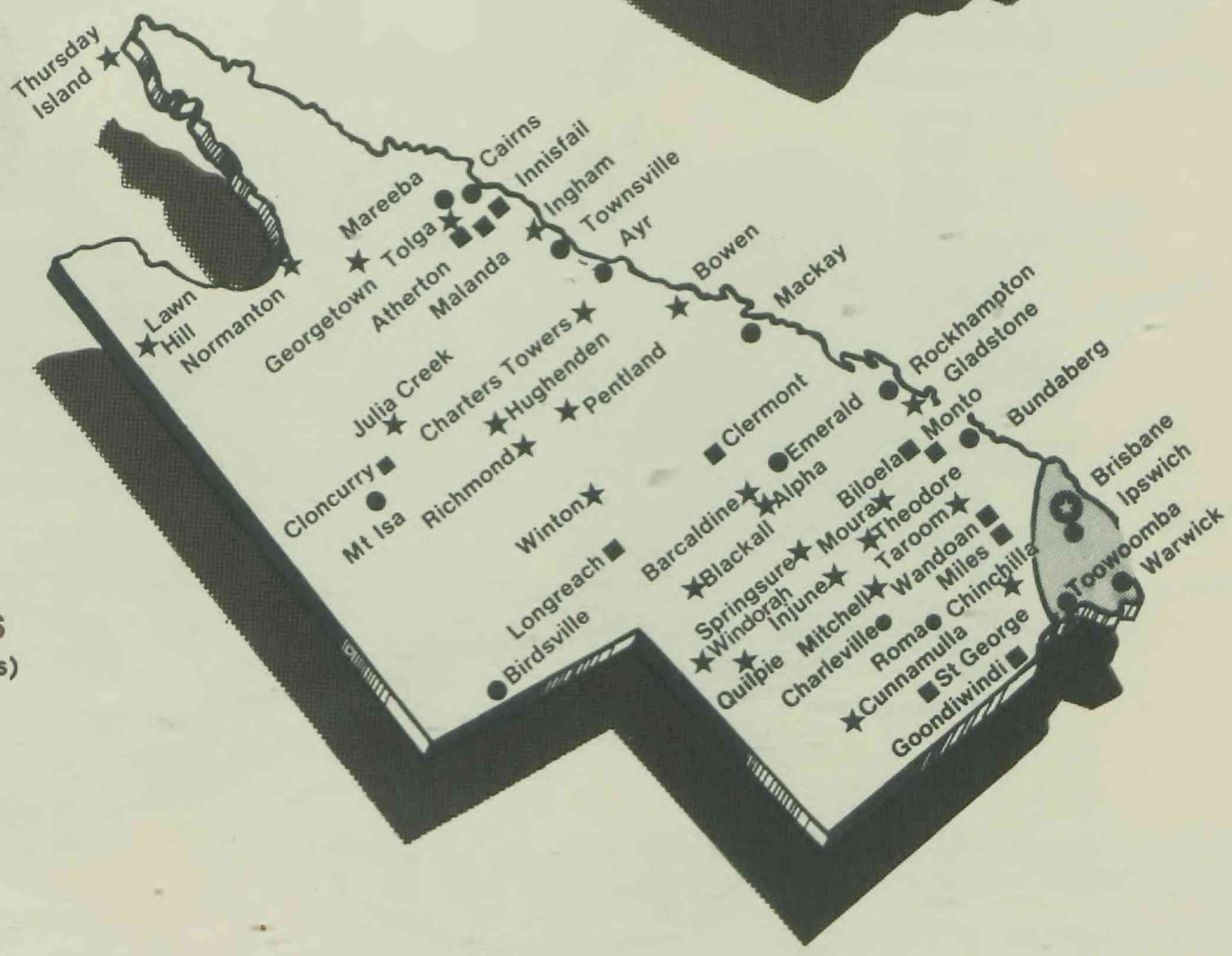
- supervising meat slaughtering and meat quality for domestic consumption;
- issuing permits to move stock;
- inspecting butcher shops;
- being responsible for quarantine of livestock and plants as agent for the Commonwealth Government;
- recommending in relation to declarations of drought-affected areas;
- supervising the activities of rural marketing boards and cooperatives; and
- assuring the quality of all rural produce.

Regulatory officers are required to maintain the effectiveness of the Acts for the benefit of farmers and of the community as a whole.

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)

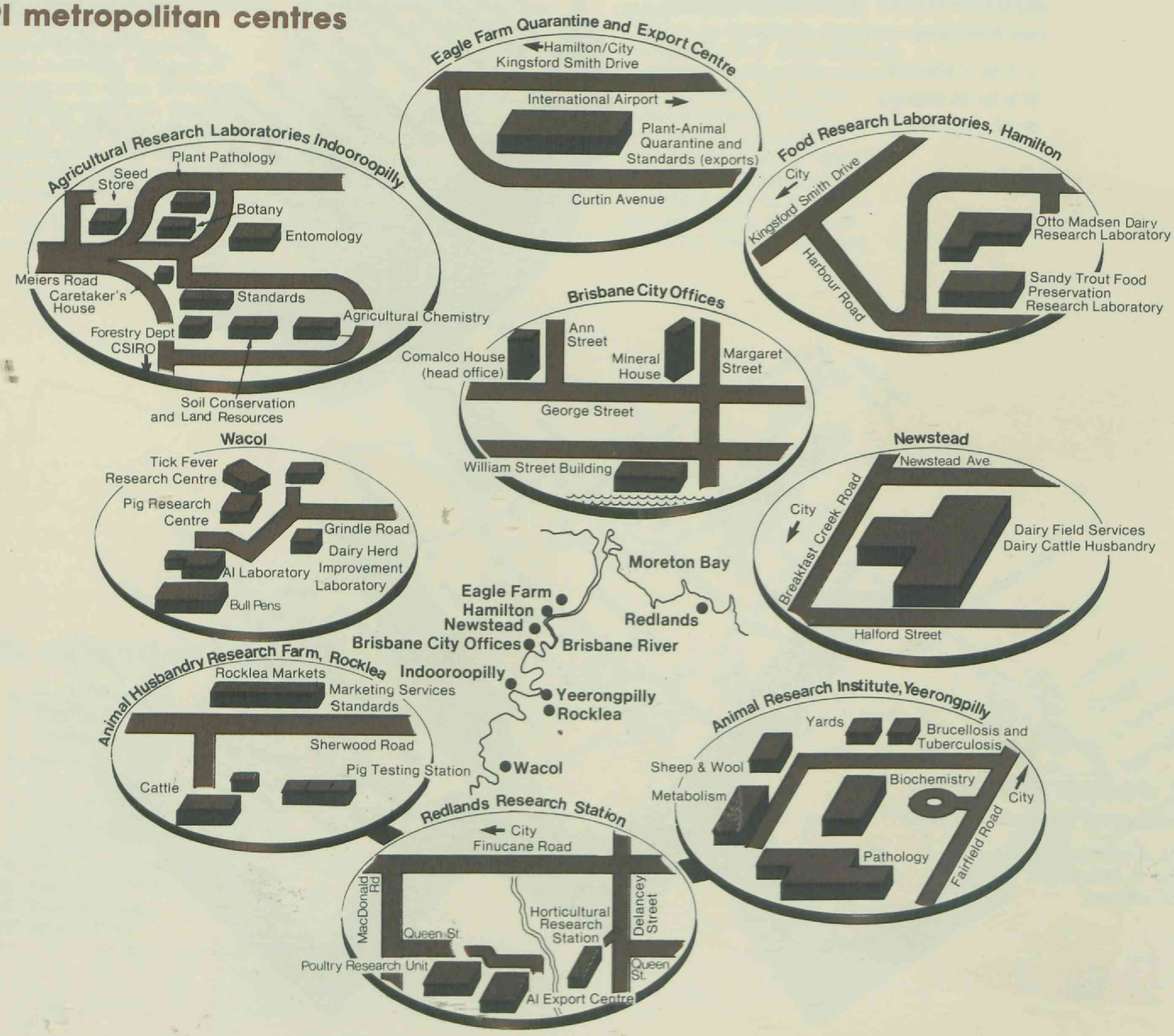
- ★ 1 to 4 officers
- ■ 5 to 11 officers
- ● 12+ officers

Information services

To complement its research, extension and regulatory functions, the DPI maintains a State-wide information service. The many facets of this service include:

- the DPI *Annual Report* to Parliament;
- the *Queensland Agricultural Journal*, which is published six times a year, is an important extension vehicle containing comprehensive articles on the practical application of DPI research, and is sold on subscription to commercial and part-time farmers, agribusiness people, students and scientists in Australia and overseas;
- the *Queensland Journal of Agricultural and Animal Sciences*, which is published twice a year and contains scientific papers written mainly by DPI research workers;
- Farm Notes, which are prepared for primary producers to meet their need for timely, practical and concise advice on a single agricultural topic, and which are provided free on request at DPI offices;
- an extensive range of saleable books, available at major DPI centres and through the DPI Information Centre in Brisbane;
- a weekly news release and special feature service to metropolitan and provincial newspapers and to radio and television stations in Queensland and around Australia;
- a weekly tape of interviews on topical issues with DPI officers and sent to Queensland ABC and commercial radio stations;
- the work of regional information officers in Rockhampton and Toowoomba, who provide professional information support to DPI staff and who publicise DPI activities through local mass media and other outlets;
- displays at the Brisbane Show and major country shows;
- a variety of marketing publications, sent to mass media representatives and other interested people, which include the daily *Fruit and Vegetable Market Report* and the *Fish Market Report*, the weekly *Rural Trend Report*, the monthly *Horticultural Trends and Marketing Newsletter*, the bi-monthly *Agricultural Trends*, and the quarterly *Trends in Animal Industries;* and
- many district extension newsletters sent to primary producers from more than 25 DPI centres throughout the State, covering the dairy, horticulture, pig, poultry, beef, sheep and field-crop industries.

DPI metropolitan centres



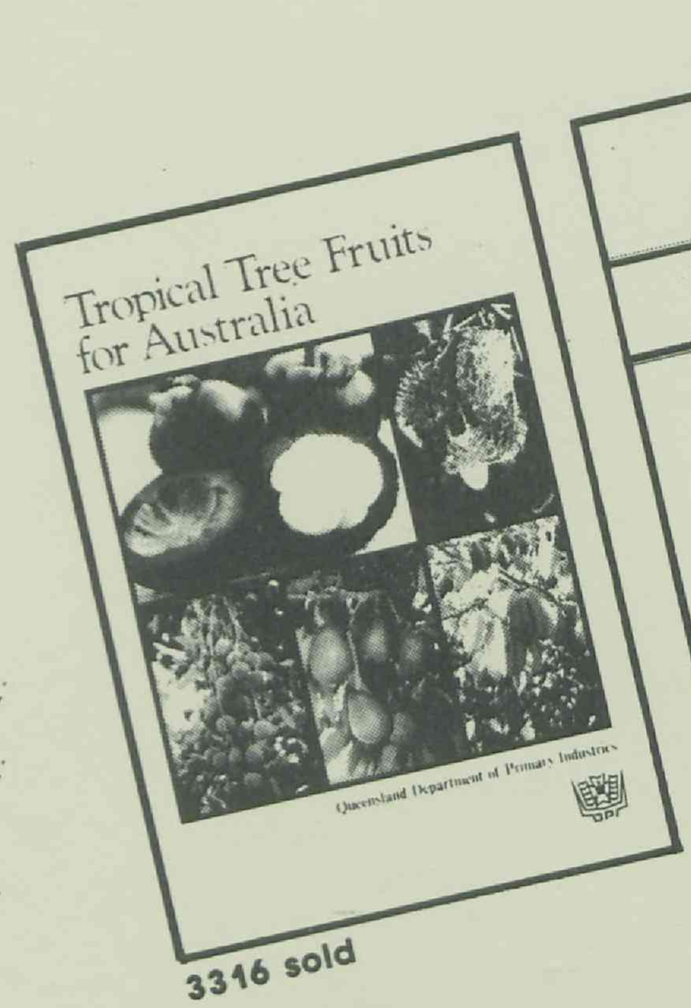
DPI's top ten titles for 1984-85

At 30 June 1985, the DPI, through its Information and Extension Training Branch, had more than 70 saleable book titles on its book list.

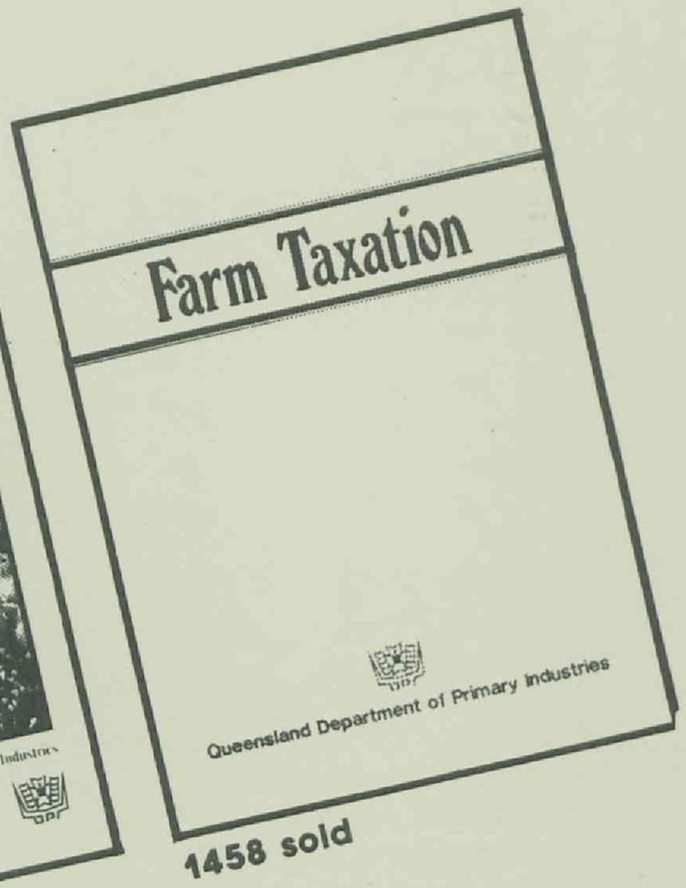
The 10 most popular DPI titles are illustrated on this page. Demand came from all primary producer groups. Fruit and vegetable growers showed a particular interest in the top five titles. *Vegetables in the Home Garden* and *Insect Pests in the Home* were popular with householders and consumers.

The top-selling titles, *Tropical Tree Fruits* and *Farm Taxation 1984-1985,* were among the 13 new titles released during the year. The others were:

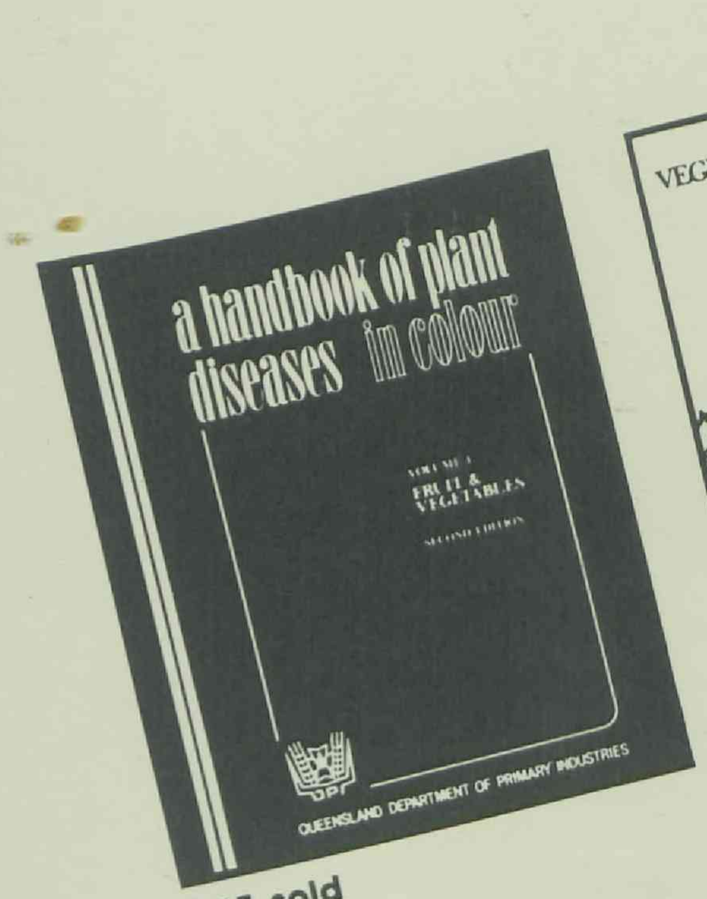
- *A Primary Producer's Guide to Microcomputing;*
- *Brigalow Belt of Australia;*
- *Citrus Propagation in Containers;*
- *Crab Farming in Japan, Taiwan and the Philippines;*
- *Cropping in the Maranoa and Warrego;*
- *EVAL: A Project Evaluation Program for the Apple IIe Computer;*
- *Insect Pests in the Home;*
- *Major Woody Weeds of Western Queensland and their Control;*
- *Nutrient Composition of Feedstuffs for Pigs and Poultry;*
- *Plant Nematology for Practical Agriculturists; and*
- *Vegetation Survey of Queensland: South Central Queensland, Botany Bulletin Number 3.*



3316 sold

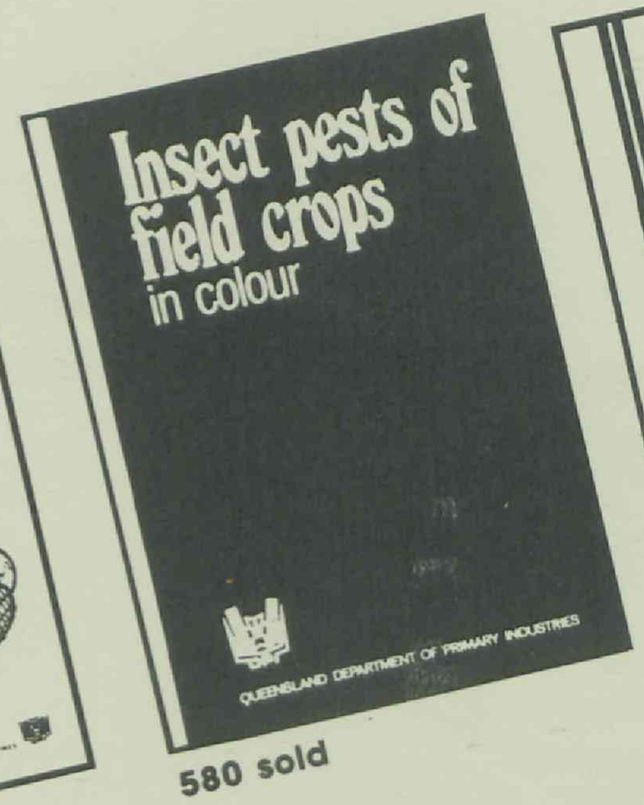


1458 sold

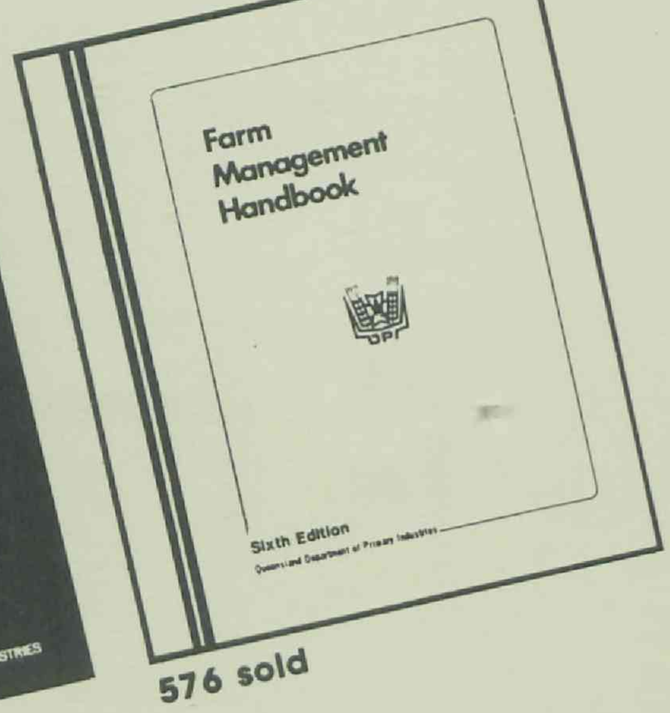


715 sold

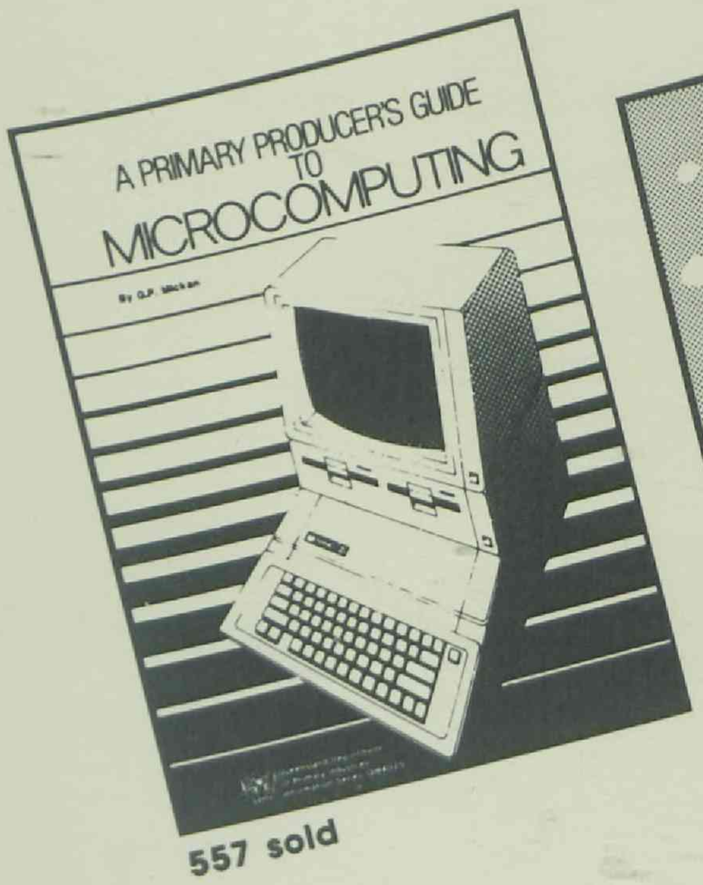
684 sold



580 sold

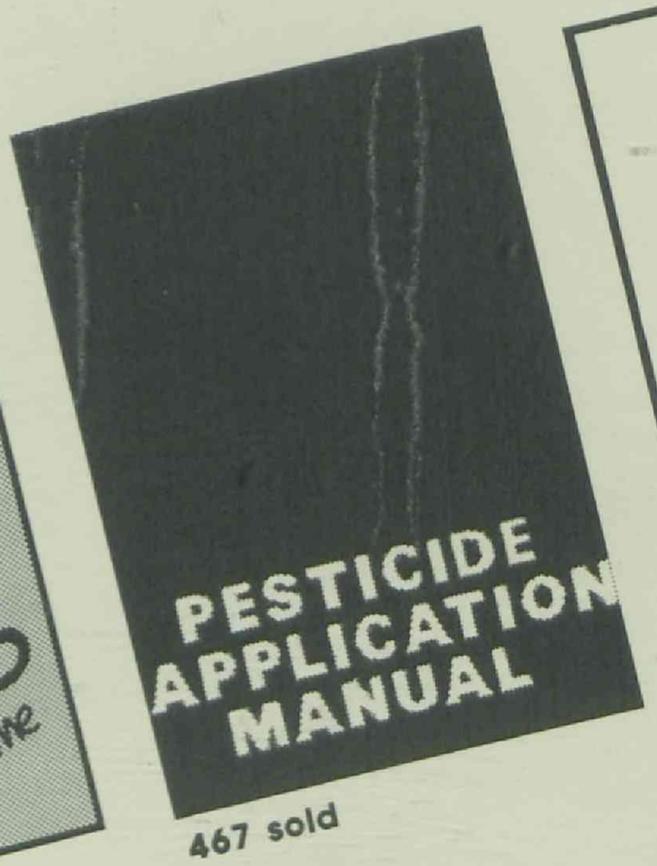


576 sold

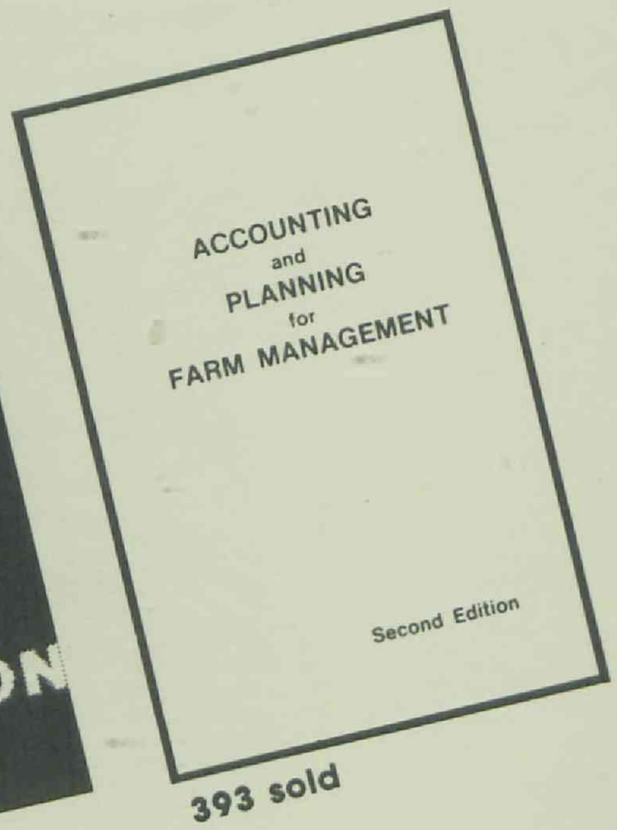


557 sold

550 sold



467 sold



393 sold

Books are sold through the DPI Information Centre, 9th floor, Mineral House, 41 George Street, Brisbane, and at selected regional DPI offices.
The address for postal orders is GPO Box 46, Brisbane 4001.

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