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*Queensland
Primary Industries*

Annual Report 83-84

NOT FOR
LOAN

Minister for Primary Industries Hon. N.J. Turner, M.L.A.

Directorate

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Organisation

The DPI 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 with the assistance of 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.

Responsibility for coordination and performance in technical areas rests with divisional directors, who are supported by their branch structure and senior officers at centres throughout the State. A director heads each branch within a division. The DPI has six divisional directors and 30 branch directors.

The DPI's approved public service staff establishment at the end of June 1984 was 2 843. If the major activity of officers is 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 more than 10% in full-time extension. Many research and regulatory staff also have some extension duties.

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Queensland Primary Industries Annual Report 83-84

Presented to Parliament by Command

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The year reviewed

Rural production

The financial year 1983-84 was a much improved year for Queensland primary industry. The gross value of the State's rural production was almost \$3 100m, an increase of 30% on 1982-83.

The State was freed from the grip of a severe drought. Rain resulted in a great surge

of pasture growth throughout the main pastoral districts. Unfortunately, heavy rain on denuded soil caused erosion in the agricultural areas of the Darling Downs, Maranoa, Burnett and Central Highlands.

Seasonal conditions

When 1983-84 began, 15 central Queensland shires remained drought stricken. The rest of the State received good winter rains, resulting in significant wheat and barley production. By March, all shires had been deleted from the list of declared drought areas, with fewer than 50 properties remaining independently drought declared.

Despite the excellent summer rains, two areas—the eastern portion of the Bowen Shire and an area at Nanango—received the lowest recorded rainfall for the summer months, December to March. The extremely dry areas covered Nebo, Marlborough, Daringa, Blackwater, Wowan, Dululu and Biloela.

Assistance schemes and subsidies

Two subsidy schemes ended: the Commonwealth Fodder Subsidy Scheme on 30 June 1983 and the Commonwealth Drought Relief Interest Subsidy Scheme on 31 December 1983. The full range of assistance measures available under the Commonwealth-State Natural Disaster Relief Arrangements continued until 29 February 1984, when assistance returned to basic core measures.

The assistance measures available for properties declared drought-stricken on or after 1 March 1984 were: concessional loans from the Agricultural Bank, and a 50% subsidy on freight for eligible drought movements of livestock, for fodder to feed livestock in declared areas, and for the carting of water to central dispersal points.

Large amounts of money were expended in loans for carry-on and restocking purposes, and for road and rail freight rebates for restocking properties and returning livestock from agistment. Cost-of-agistment subsidy involved a large expenditure of Natural Disaster Relief Arrangements funds.

The main categories of expenditure, totalling \$62m, are summarised below.

Assistance measure	Expenditure \$
Rail and road freight rebates	9 547 000
Fodder subsidy	1 460 000
Cost of agistment	6 756 000
Scrub feeding subsidy	1 246 000
Droving subsidy	90 000
On-property slaughter subsidy	78 000
Drought relief loans	
for primary producers	41 422 000
Relief loans for small country businesses	1 333 000

Natural disasters

A total of \$65 000 was expended on fodder and freight subsidies for flood-isolated livestock in the area south of St George. The unusually heavy winter rains flooded many properties, and the State requested the RAAF's help with special fodder drops.

Cabinet approved a trial scheme to subsidise the insurance premiums for fruit growers in the hail-prone Granite Belt. A



Dr G. I. Alexander
Director-General

Protracted rains during the 1983 winter caused severe gulying of black-soil waterways and contour bank outlets. Soil degradation from water erosion and salinity is the major constraint on the long-term sustained productivity of Queensland's agricultural and grazing lands.



total of 137 fruit growers took part in the scheme and insured crops to the value of \$4m. Assistance under the Natural Disaster Relief Arrangements was not available to those growers participating in the insurance scheme. During the summer, hail damage resulted in claims totalling \$500 000 being finalised.

Widespread flooding occurred in western and north-west Queensland in January 1984. The city of Mt Isa and the shires of Bullóo, Burke, Carpentaria and Richmond were declared a disaster area for the restoration of public assets. Damage to grazing properties was minimal.

Cyclone 'Kathy' severely damaged the prawn trawling fleet in the Gulf of Carpentaria in late March 1984, but damage to grazing properties was minimal.

High winds in early April caused damage estimated at \$2.6m to horticultural crops in the Beaudesert, Albert, Redlands and Gold Coast shires. Cabinet implemented an assistance scheme for eligible growers based on normal Agricultural Bank interest rates, with loans up to \$30 000 repayable over 7 years.

Extension developments

Increased emphasis in extension activities was directed towards longer-term managerial developments. These included: demonstrations of the use of legumes in coastal and sub-coastal Queensland; the evolution of cultivation practices aimed at the conservation of soil, water and energy; and aspects of financial management for farmers.

Extension staff sought efficient communication with farmers in a variety of ways, including group activities, producer schools and field days, newsletters and self-service information stands. New ways were sought to improve the standard and efficiency of communication. The use of video as an extension medium was being studied.

An internal bulletin, the *Extension Courier*, was published to improve communication between extension officers stationed throughout the State. Field staff were producing regularly 40 specialist newsletters for the State's primary producers. The Department was evaluating the effectiveness of newsletters published in western Queensland to provide guidelines on the information needs of producers in the more remote areas of the State.

Field staff in the near-urban areas reported a continuing need to balance the demand for their services between their traditional 'clients' (that is, full-time commercial farmers) and the growing numbers of hobby-farmers seeking an alternative farming lifestyle.

DPI facilities

The high point was the official opening on 5 August of the \$1.6m Maroochy office and laboratory complex at Nambour. Fruit growers and their representative organisations attended the opening.

Completion of a glasshouse and planthouse at the Biloela Research Station advanced the plant-breeding programme in the region.

The provision of controlled-environment cabinets and a glasshouse at Redlands Horticultural Research Station boosted the station's horticultural research programme.

At Redlands, construction of a poultry isolation unit to replace the Rocklea poultry facility was well underway. This major project, when completed, is expected to cost \$1.25m.

After examining the Heussler Committee Report, which reviewed Departmental services to the pastoral areas of western Queensland, the Government agreed to implement recommendations dealing with the need for arid and semi-arid research. Agreement in principle for an Arid Zone Research Institute and an associated research station at Longreach, at a capital cost of more than \$4m over a 3-year period, was announced.

The DPI exhibit at Farmfest in September 1983 included displays and personal advice covering agricultural engineering, soil conservation, crops, cattle, pigs, dairy herd nutrition and farm management. The DPI is a regular exhibitor at Farmfest, which is one of Australia's biggest rural machinery exhibitions. It is held over 3 days at Kingsthorpe (midway between Toowoomba and Oakey).



A town site for the research centre's laboratories and office was acquired, and a site for the animal houses was being obtained. Building design and site soil surveys had begun. When completed, the institute will be a major addition to the DPI facilities at Charleville and Toorak.

Symposium on poisonous plants

The second Australia-United States symposium on poisonous plants was held in Brisbane in May 1984. The Queensland Poisonous Plants Committee organised the symposium in association with counterparts at the Poison Plant Research Laboratory, Logan, Utah, where the first symposium was held in 1977. The Department of Primary Industries, the University of Queensland, the CSIRO, the Queensland Health Department and the Royal Children's Hospital are represented on the committee. Eighty scientists from Australia, the United States, the United Kingdom, Canada and New Zealand discussed 70 papers dealing with aspects of plant toxicosis in livestock, and participated in a field trip to see poisonous plants growing in their natural environment.

The National Pig Fair

Queensland hosted the 1984 National Pig Fair, which attracted more than 6 000 visitors to the Toowoomba showgrounds. Department staff were closely involved with the organisation and running of the fair. The DPI's stand, with the theme 'Get the Picture on Raising Pigs', offered information and advice on all aspects of pig raising. The role of computers in piggery management and the Department's main services to the pig industry were emphasised.

Meat inspection

In May, the Commonwealth and Queensland governments agreed in principle to rationalise meat inspection arrangements in Queensland. Negotiations began on an agreement between governments for the Commonwealth Meat Inspection Service to be responsible for all inspection and allied functions in export meat works. Consequent on the new arrangements, a single fee structure will emerge: a Commonwealth charge in export works and a State charge in domestic works. State disease-control activities will continue in all works as will inspection activities in the non-export area.

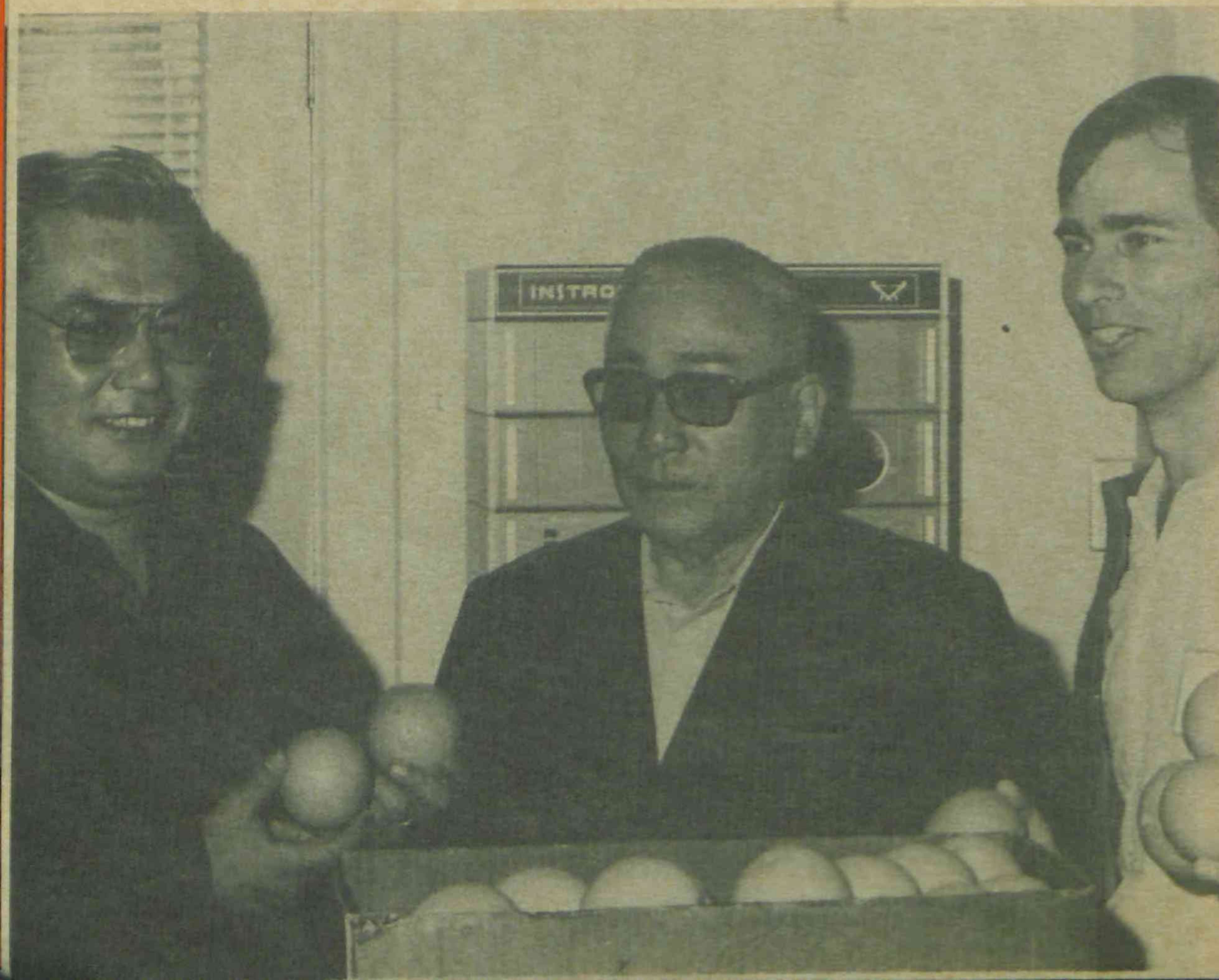
Japanese citrus importers inspect fruit before the first shipments from Queensland to Japan in September 1983. Research at the DPI's Sandy Trout Food Preservation Research Laboratory at Hamilton, Brisbane, on eliminating fruit-fly fumigation residues, made this shipment possible.

Brucellosis and tuberculosis

Queensland continued with the programme to eradicate both bovine brucellosis and tuberculosis from the State's cattle herds. Ninety-nine per cent of all herds were free, or provisionally clear, of brucellosis. Tuberculosis-infected herds were largely confined to the northern and western parts of the State, where eradication on the remote and extensive properties is difficult. Because destocking procedures were becoming increasingly important in these remote areas, additional forms of assistance were made available to assist graziers. These assistance measures were included in a new Commonwealth-Queensland BTEC Agreement, which relates to the administration of brucellosis and tuberculosis eradication in cattle and which was signed by the Honourable J. Kerin and Honourable N. J. Turner in March 1984.

Exotic disease extortion threat

The Department's disease control and



investigation services were placed on full alert after an extortion threat was made to release foot and mouth disease virus into the State's livestock industries. This threat stimulated a major extension campaign to increase exotic disease awareness among pastoralists. The public responded to the animal disease threat with many reports, which Department staff investigated. The alert was suspended after the Queensland Police Department laid charges.

Pesticide monitoring

Monitoring of cattle slaughtered at abattoirs for pesticide residues indicated a stock owners compliance rate of more than 99.5% with the relevant pesticide legislation. Surveillance of meat quality must be maintained in the interests of public health and the maintenance of a profitable export market.

Research in the Department

The Queensland DPI is recognised as a major agricultural research organisation in Australia and overseas. In its research, it is using a task force approach to tackle research problems on a whole-industry basis rather than within the narrow confines of scientific discipline. For example, the Department has adopted integrated programmes for surface soil management in various cropping areas, for the examination of soil salinity problems, and for the integrated pest management and plant breeding programmes.

In 1983-84 the research budget totalled \$40m and supported 370 research scientists and an equal number of technical officers. Research facilities include 22 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.

Computers and the farmer

Effort was directed at developing computer software and agricultural information packages to capitalise on the Department's computer facilities. Crop-protection management systems encompassing pest and disease identification, pest control and integrated pest-management systems and pesticide information were selected for priority development. Other development areas include: post-harvest technology for storage and handling of horticultural produce, crop-yield forecasting and forage-utilisation strategies for beef production.

New agricultural systems

After 20 years' investigation, the essential elements of new field-crop production systems that combine productivity and stabilisation of soil erosion have been defined. The systems embody changes in crop rotations, fallow practices and tillage methods, including herbicide substitution for tillage operations and maximum utilisation of crop and crop residue covers. Important changes in pest and disease management and fertiliser practices are also involved.

Much remains to be achieved in evolving these new systems, but the commitment of producers and Department research and extension staff to the programmes gives confidence that Queensland's long-term agricultural future can be assured and that the enormous problem of soil erosion in the main agricultural areas can be overcome.

Soil conservation and land management

Some reduction in soil-erosion control works occurred during 1983-84, but the

Tropical Tree Fruits for Australia (in hard and soft cover) and *Insect Pests in the Home* were among a number of new titles published in 1983-84, bringing the number of DPI books for sale to more than 60 titles.



strong interest in soil conservation continued. The demand for help with runoff control structures was greater than could be provided, and conservation cropping was gaining acceptance. These control methods are complementary and when combined ensure maximum erosion control.

Formation of the Soil Conservation Research Branch in the Department formally brought together experts in soil conservation, hydrology, soil physics, agronomy and farm tillage. Research and development programmes in conservation cropping were being spread across grain and sugar-cane areas; expansion into the dry tropics was planned. Many farmers were adopting at least some parts of this concept, and the Department was making a concerted effort to establish and promote more complete systems of management.

The staff expansion programme in the soil conservation area has continued. However, the demand for services continues to outstrip the Department's capacity to provide and train new soil conservation staff within the constraints of the State Budget. Initial limited involvement of the Commonwealth Government in the land-management area was welcome. Hopefully, its programmes will provide some of the additional technical staff that are needed in this important area.

Local authorities generally were making greater efforts to plan development with land suitability in mind. Staff numbers limit the Department's capacity to provide land suitability information for all areas of the State. The *Mackay Sugar-Cane Land Suitability Study* was virtually completed, and the report on the land resources of the South Burnett Region was published along with the *Australian Soil and Land Survey Field Handbook*.

Training of overseas staff

The Department developed and conducted, through its Overseas Development Section, two courses during the year. A 3 month dairy husbandry/technology course, designed for the Philippines and funded by the Australian Development Assistance Bureau, was attended by 18 participants. A 9-week tropical pasture and fodder seed production course, funded by various international aid agencies, drew 18 participants from 12 countries.

Training was provided for overseas personnel in dairy production and artificial insemination, beef cattle husbandry, pesticide management, entomology, plant pathology, parasitology, irrigation, soil conservation, seed production and extension methods. Participants came from China, Fiji, Papua-New Guinea, India, Bhutan, the Philippines, Indonesia, the Seychelles and Mauritius.

The Department organised a number of study tours and visits for senior executives from a number of countries. The Thailand Deputy Minister for Agriculture and Co-operatives and a delegation of 13 senior officers of his Ministry inspected the DPI's livestock development work. They also inspected Droughtmaster cattle and Saanen goats selected by Department officers for export to upgrade its Thai herds and flocks.

Overseas consultancies

Department officers undertook short-term consultancies in Malaysia, Papua-New Guinea, Ethiopia, the Philippines, Indonesia, Fiji, China, Thailand and Burundi. The Director of the Marketing Division took part in a major FAO consultancy to assess training needs for 14 African countries in grain production, storage, distribution and marketing. As a result, Department staff may be involved in some training proposals for these countries in the future. Such involvement will benefit staff and the rural community.

Research for ACIAR

The Department was involved in three projects, involving \$1.1m in research funds, for the Australian Centre for International Agricultural Research

Milk quality testing was among the topics that these students learnt while at the DPI's Kairi Research Station on the Atherton Tableland in April 1984. They were among a group of 18 students from the Philippines who took part in a 3-month husbandry-technology course designed for the Philippines. DPI dairying officers organised and conducted the course, which the Australian Development Assistance Bureau funded.



(ACIAR). This is a Commonwealth Government funded body with the role of mobilising Australian agricultural research capability to undertake collaborative research projects in developing countries.

Entomology Branch, in collaboration with the National Post-Harvest Institute for Research and Extension in the Philippines and the Malaysian Agricultural Research and Development Institute, was studying integrated pest control in grain storage in the humid tropics.

The horticulture post-harvest group at the DPI's Sandy Trout Food Preservation Laboratory was collaborating with the CSIRO and the Northern Territory Department of Primary Production to study physiological, chemical and storage characteristics of mango in the ASEAN region.

The DPI's Oonoonba Veterinary Laboratory, Townsville, was collaborating with James Cook University and Indonesia to study malignant catarrhal fever in cattle.

Export promotion

During the year, the Department took part in the planning of a new initiative for export promotion in South-East Asia and agreed to take part in an agricultural exposition, AGASIA '84, in Malaysia in August 1984. An Enterprise Queensland exhibit, which included a DPI display, was arranged in collaboration with the Special Projects Group of the Premier's Department.

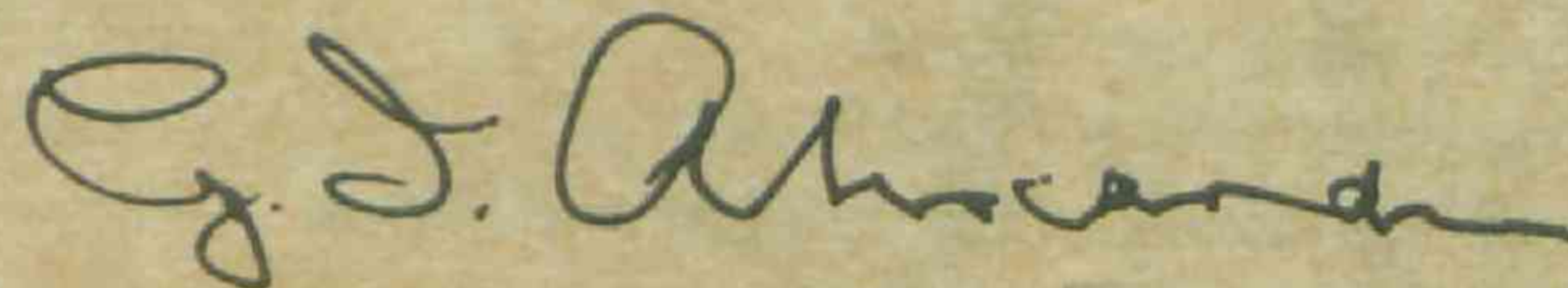
The Department was represented on a Premier's Department-initiated steering committee to plan a trade mission to China in 1985 as part of the Enterprise Queensland promotion programme.

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 the employment and training of people of Aboriginal and Torres Strait descent. In 1983-84, 25 trainees were employed under NESA within the Department to gain personal skills and work experience.

Funds totalling \$500 000 from the Commonwealth-State Wage Pause Employment Creation Programme provided temporary employment for people in projects to improve facilities and operations at 14 of the Department's research stations.

A total of 78 people were employed in projects totalling more than \$1.3m under the Commonwealth Government's Community Employment Programme. The Department's Research Stations Branch received \$777,000 for seven projects, the largest of which was the construction of a cattle-proof fence from Hughenden to Cloncurry as part of the cattle-tick control programme in north-west Queensland.



G.I. Alexander
Director-General

Finance

The Department's accounting system was computerised through a network of microcomputers.

Once again, natural disasters placed heavy demands on finances in 1983-84. Assistance payments made by the DPI and subject to cost-sharing arrangements totalled \$18 473 506. This was \$7 605 024 below the previous year's figure. However, the costs of administering the joint Commonwealth-State Disaster Assistance Scheme inspections and of processing payments were met wholly from DPI funds.

DPI expenditure from the Consolidated Revenue Fund is shown below:

Vote sub-division	1982-83 \$	1983-84 \$
Payments authorised by special Acts		
Grant in aid of the Banana Industry Fund	146 204	129 910
Department of Primary Industries		
Salaries	48 729 487	51 348 455
Contingencies	32 687 779	35 166 411
Total	81 563 470	86 644 776

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

	1982-83 \$	1983-84 \$
Eradication	8 900 000	9 800 000
Compensation payments	4 200 000	2 100 000
Additional assistance	—	2 400 000
Total	13 100 000	14 300 000

Expenditure incurred from Trust and Special Funds is shown below:

Trust and special funds	1982-83 \$	1983-84 \$
Department of Primary Industries Special		
Standing Fund	29 563 743*	24 664 459*
Banana Industry Fund	282 024	293 161
Commonwealth Poultry Industry Assistance		
Fund	3 403 960	3 232 942
Commonwealth Quarantine and Export		
Inspections Fund	437 187	723 122
Commonwealth Rural Industry Grants Fund	2 511 629	2 692 077
Fisheries Research Fund	475 474	362 584
Meat Inspection Account	3 533 876	3 832 800
Poultry Inspection Fund	701 681	756 421
Potato Marketing Trust Fund	13 823	—
Stock Disease Compensation and Stock		
Improvement Fund	26 539	32 596
Sugar Cane Prices Fund	1 909 652	1 888 076
Swine Compensation Fund	17 661	14 900
Total	45 877 249	41 493 138

*Includes \$26 078 530 and \$18 473 506 on account of Disaster Assistance Scheme and \$836 506 and \$860 903 on account of the Queensland Fish Board, in 1982-83 and 1983-84 respectively.

Expenditure of \$299 999 was incurred through the Loan Fund to 30 June 1984.

Rural production values

The gross value of rural production in Queensland in 1983-84 was almost \$3 100m, 31% higher than in 1982-83. This increase can be attributed to the excellent growing conditions that followed the breaking of the long drought.

The value of cereal grains was expected to reach \$596m, almost double the previous year's level. The largest increases were in wheat (up 123% to \$299m), grain sorghum (up 71% to \$161m), and barley (up 125% to almost \$90m). Plantings of these crops were better than last year and most districts had higher yields.

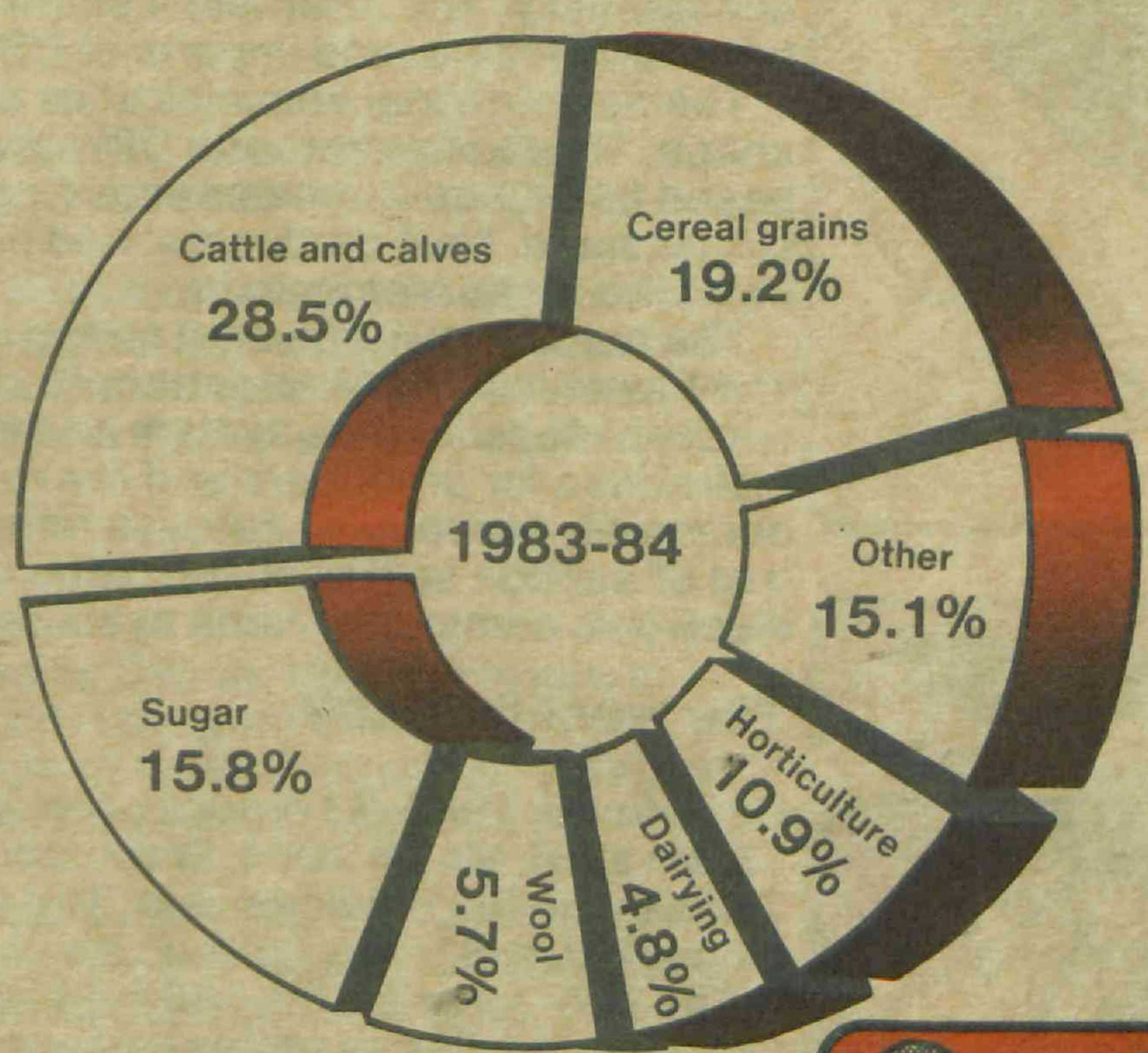
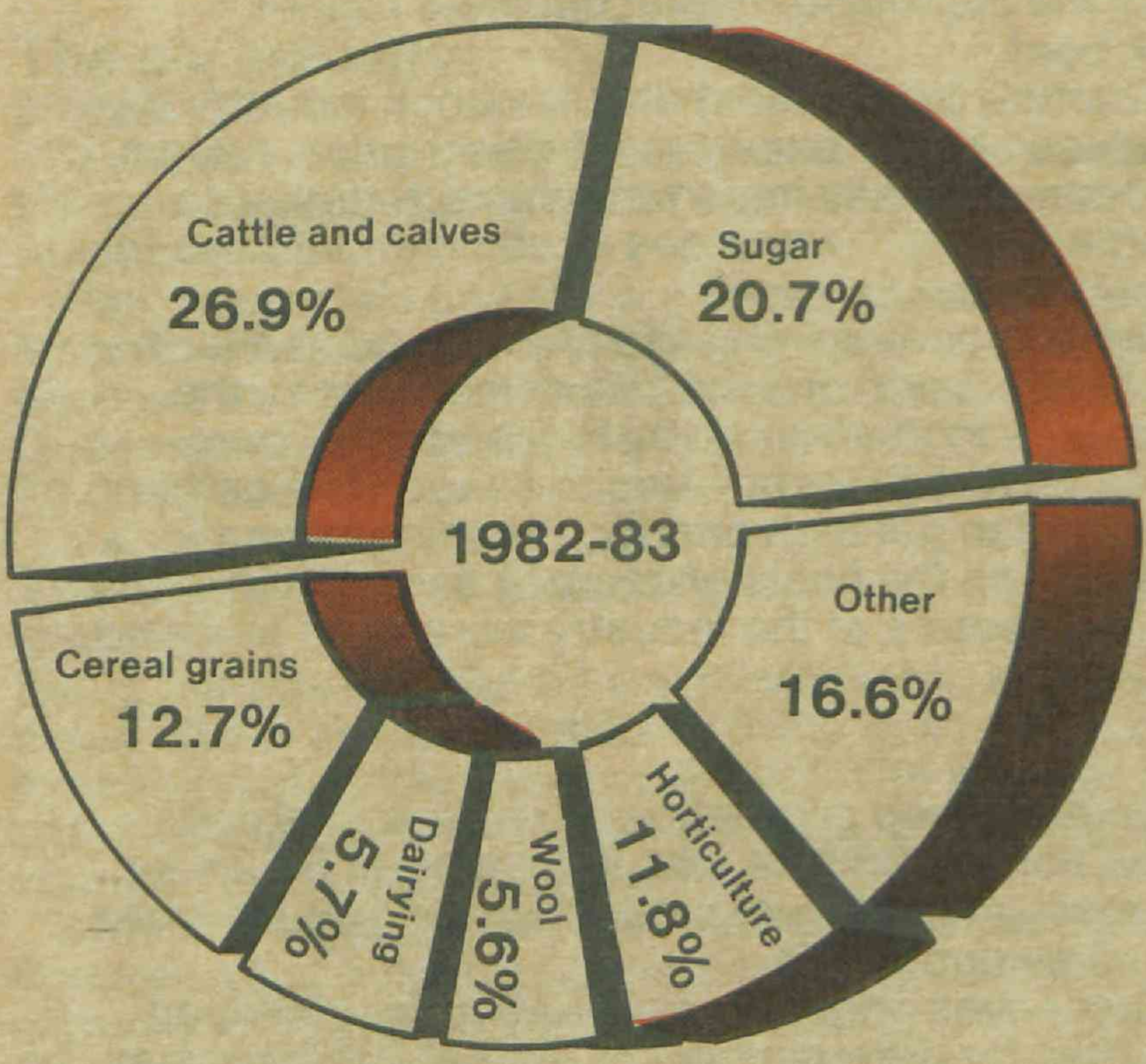
Values for most other agricultural crops also rose significantly during 1983-84. The value of peanuts rose by 135% to \$40m and cotton by just over 23% to \$59m. These increases are due largely to the effects of the unseasonably wet conditions, in April and May 1983, on the 1982-83 crop.

The sugar industry remained depressed, because of overseas market conditions. Its value of production, at \$491m, was unchanged on last year's low level.

Livestock slaughterings were valued at \$1 032m, up 31% on the 1982-83 figure. The value of cattle and calf slaughterings, by far the biggest component in this category, rose by 38% to \$882m. Poultry slaughterings were put at \$50m and pig slaughterings at \$82m.

The values of most livestock products also increased. Wool was put at \$177m (up 33%) and dairying at \$150m (up 10%).

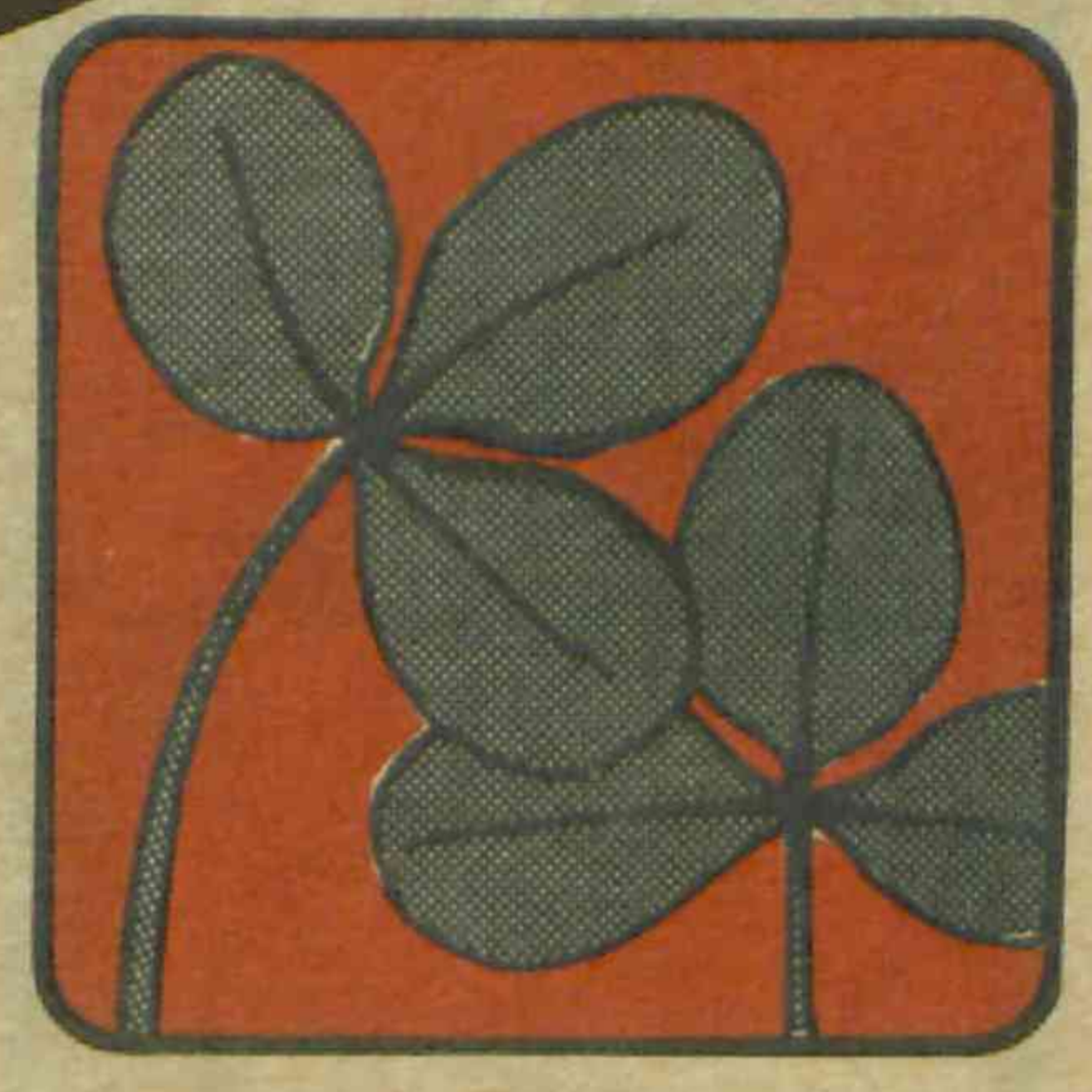
Primary industries overview



Pasture and fodder crops

The rains late in 1982-83 established a good moisture base for much of Queensland during 1983-84. Although part of the lower north-west continued drought stricken through the rest of 1983, a heavy summer wet season in these areas broke the drought and produced the best pasture growth for years.

Winter rains and mild temperatures in many areas resulted in good winter herbage



growth for stockfeed. Good soil-moisture conditions allowed grass to remain green, providing some feed even though it lacked body because of insufficient growth.

Pasture conditions throughout most of the State during the second half of 1983-84 ranged from good to excellent, and moisture reserves were generally adequate for the planting of fodder crops in inland areas.

However, coastal and sub-coastal areas south from Ayr to the New South Wales border had only a light wet season. Although the south-east had good relief rain in April, the area between Ayr and Rockhampton continued dry with a poor pasture outlook for the winter.

During March 1984, the State officially became drought free for the first time in 7 years, but some properties in the Dalrymple and Longreach areas were still individually drought-declared.

The beef industry



The beef herd was estimated to be 8.8m head on 31 March 1984, 5% less than at the same time last year. This continuing decline, which started in 1978, was caused mainly by the high level of slaughterings and low branding rates during the drought. However, towards the end of the year, the herd appeared to be stabilising.

Despite excellent grazing conditions in most areas, a similar number of cattle and calves were slaughtered as in 1982-83. However, higher cattle prices and carcass weights increased the gross value of production by 38% from \$637m to about \$882m during the year.

Throughout the year, cattle prices moved upwards. The Queensland Cattle Market Index (Base 1981 = 100) averaged 121 compared with 96 in 1982-83. However, in real terms, prices were comparable with those received in 1981. As usual, prices fluctuated substantially, mainly in response to changes in United States beef prices and in the value of the Australian dollar. Access to the USA market was lost temporarily at the end of 1983; South Korea's beef import requirements declined substantially; and Australia's share of the Japanese market declined further because of increased imports of USA beef.

The new national administrative structure for the meat and livestock industry took shape. The Commonwealth DPI introduced a new export meat-description system based on objective measurements of commercially important characteristics. In Queensland, beef producers' and cattle buyers' awareness of commercial uses for objective measurements increased substantially.

The number of cattle sold on the basis of carcass classification increased further. The Livestock and Meat Authority of Queensland and the DPI demonstrated the carcass classification system and its uses to abattoir operators and producers. Instruction for producers and livestock buyers in techniques to assess live cattle accurately (especially carcass fatness) also got high priority. Planning began for a trial of auction selling of live cattle mainly on the basis of carcass description using electronic communications systems. All sectors of the industry were to be involved.

The wool industry



Despite the 1982-83 drought, the State's sheep population increased to about 13.3m at 31 March 1984. Wool production in 1983-84 was estimated at 58.2m kg, 7.6% up on the previous year. The gross value of wool production for 1983-84 was estimated at \$177m, 33% up on the previous year's.

The floor price for the 1983-84 season was originally set at 460c/kg clean, an increase of 1.3%; but after a new system for determining the Market Indicator was introduced, this was revised to 470c/kg.

During the first 6 months of the season, auction prices weakened progressively. At the end of December, the Market Indicator stood at 476c/kg, only marginally above the floor level. During this period, the Australian Wool Corporation bought 30% of the offerings, and stocks increased sharply from 928 000 bales at the start of the season to about 1.39m bales at the end of December.

The market subsequently responded to slightly improved demand and favourable exchange-rate movements. The Indicator moved steadily upwards. For the first time in Queensland, a price of 1 000c/kg greasy was obtained. By early May, the Indicator had reached a seasonal peak of 496c/kg. Consequently, the Corporation's support declined and the stockpile was reduced slightly.

The Commonwealth Government announced new arrangements to fund wool promotion on a sounder long-term basis. Under these arrangements, the Government's contribution to wool promotion over the next 5 years will be 1.2% of

the Australian clip's gross value. This will result in the Government providing at least \$25m for wool promotion in 1984-85. During the last 5 years, Government funding had been held at \$20m/year.

The sheep meat industry

The State's sheep-meat slaughterings were expected to be about 1.2m and production about 22 000 t, both slightly lower than in 1982-83.

Early in the year, lamb prices declined sharply because of an unexpected production surge from a large carryover of older lambs from the previous season, lower retail prices for beef and pork, and depressed export prices.

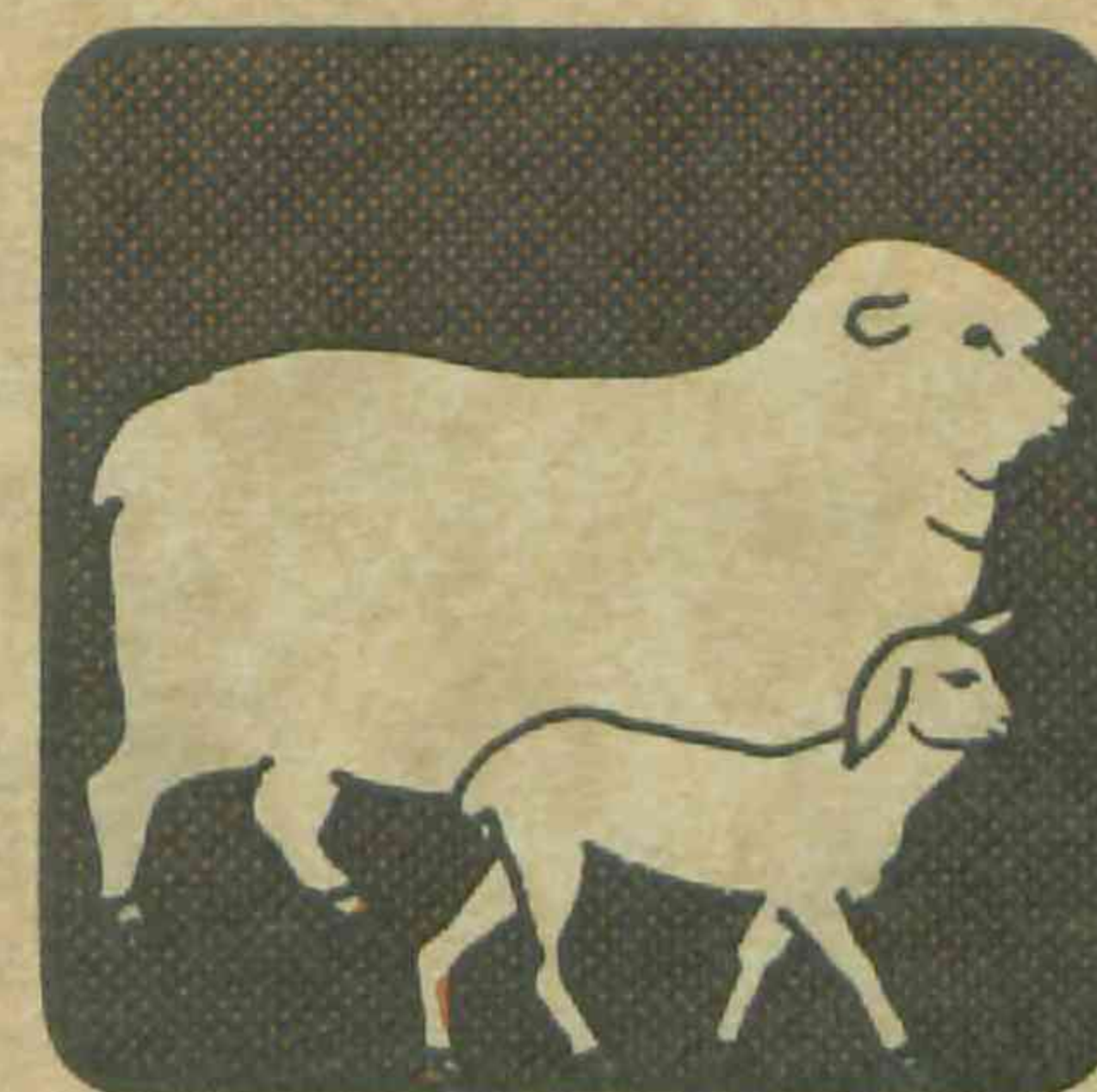
After reaching a peak of 162c/kg in May 1983, the average price of lambs (score 4, 16 to 19 kg) at Brisbane fell to 108c/kg in August 1983. This decline occurred when producers were hoping for high prices to alleviate drought-induced financial difficulties.

Prices subsequently moved steadily upwards, in response to diminishing supplies and stronger demand by the trade and graziers. By May 1984, prices had reached an average of 127c/kg. Prices in 1983-84 averaged 121c/kg, 6c below last season's average and 19c below the average for 1981-82.

The sharp winter decline in lamb prices resulted in a lively industry debate throughout the year on the merits of establishing a lamb-price stabilisation scheme. It also prompted producers to increase the lamb slaughter levy from 14c/head to 24c/head to finance market development and promotion in the lamb industry.

Mutton prices were also depressed, mainly due to weak export demand. However, in the latter part of the year, prices improved because of stronger demand for live export sheep in the southern States and strong restocker demand.

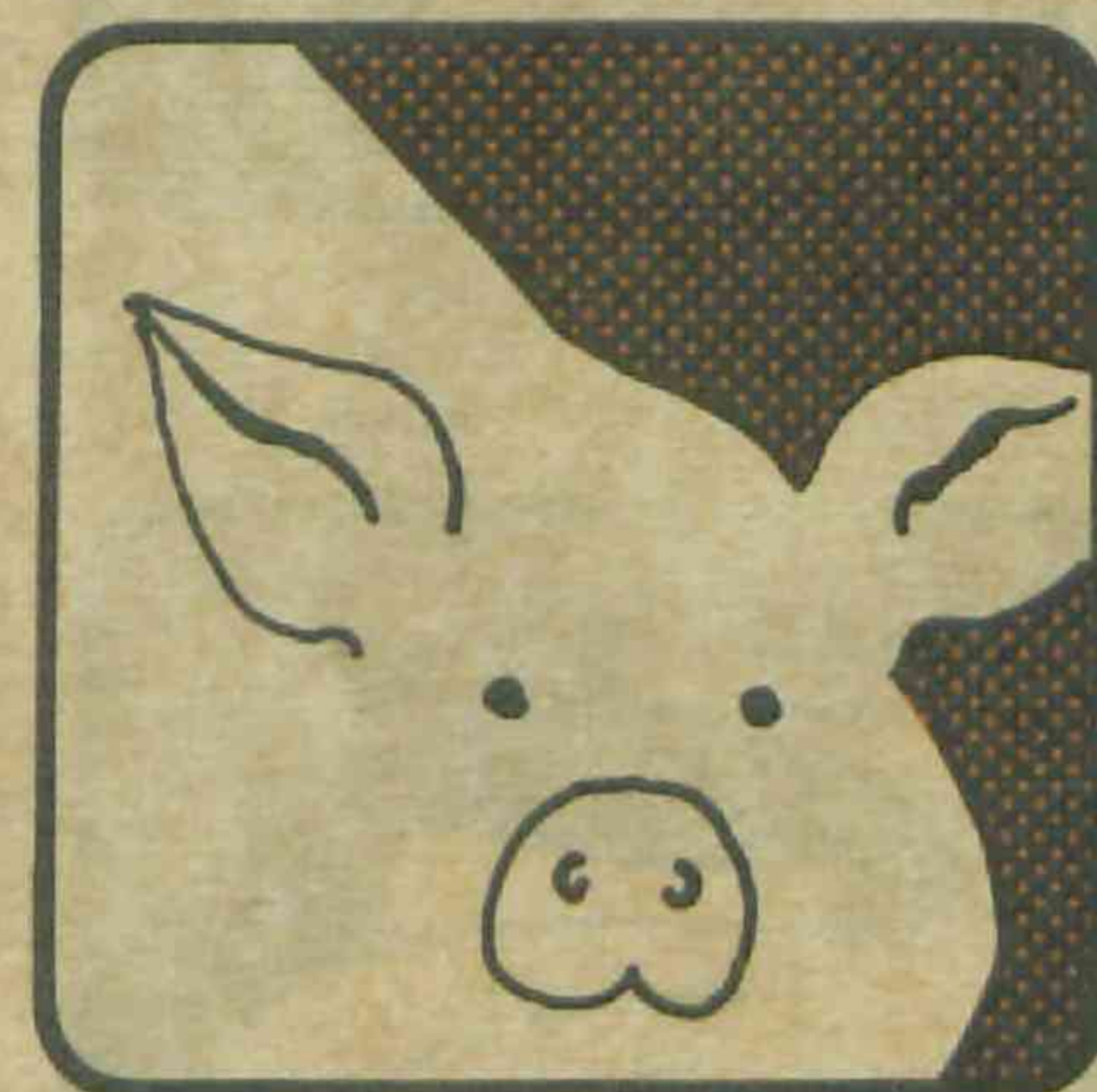
A marked feature was the strong store-sheep market, particularly in the year's second half, with producers taking advantage of the excellent season to begin rebuilding depleted flocks.



The pig industry

The expansionary trend of the previous 2 years continued, with 1983-84 pig slaughterings and production expected to rise 7% to about 925 000 and 58 000 t respectively.

High feed costs and low pig prices saw many pig raisers operating at a financial loss. However by year's end, mainly due to excellent grain harvests, feed costs had declined and pig prices had become more profitable. Preliminary estimates placed Queensland sow numbers at about 62 000, 11.4% fewer than the previous year's 70 000 head.



The poultry meat industry

Slaughterings in 1983-84 were forecast to decrease by 3% on 1982-83 levels to about 33.2m and production by 5.2% to 41 200 t, contrasting with the rapid expansion of production in 1982-83. The average age of meat chickens at slaughter continued to decline in 1983-84, a trend due to growth-rate improvements and changes in market requirements.

After the regular 6-monthly review of indexed production costs, the Queensland Chicken Meat Industry Committee set the amount paid by processors to contracted growers for rearing chickens at 28.5c/bird for July to December 1983 and 29.66c/bird for January to June 1984. The growing fee for the 1983-84 season averaged 29.08c, an increase of 5.2% on the average payment of 27.65c in 1982-83.

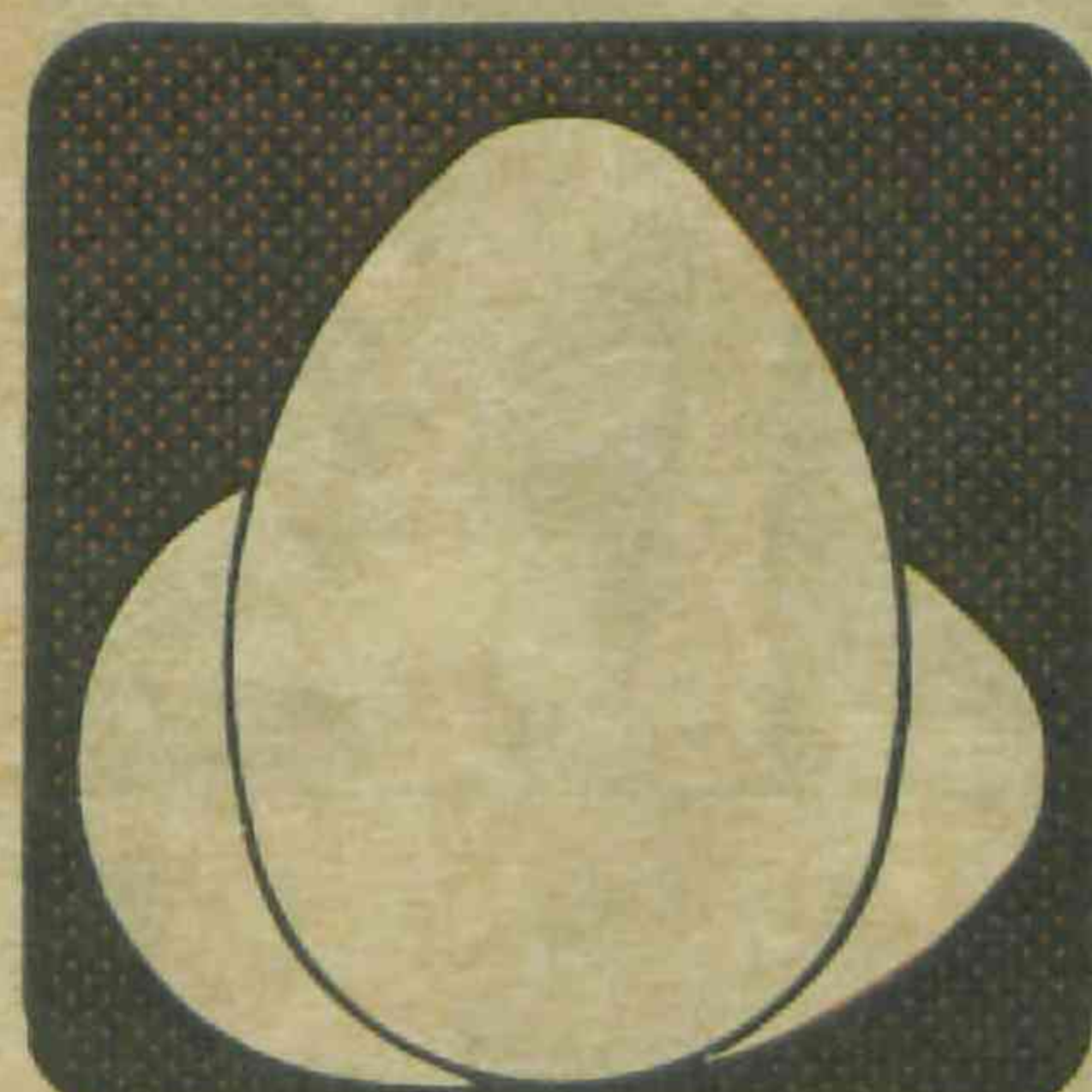
Excess shedding and slaughtering capacity caused continuing concern in the chicken meat industry. Methods of withdrawing shedding from production were examined, and a working party of the Poultry Advisory Board investigated the requirements for slaughtering facilities in the poultry industry.



The egg industry

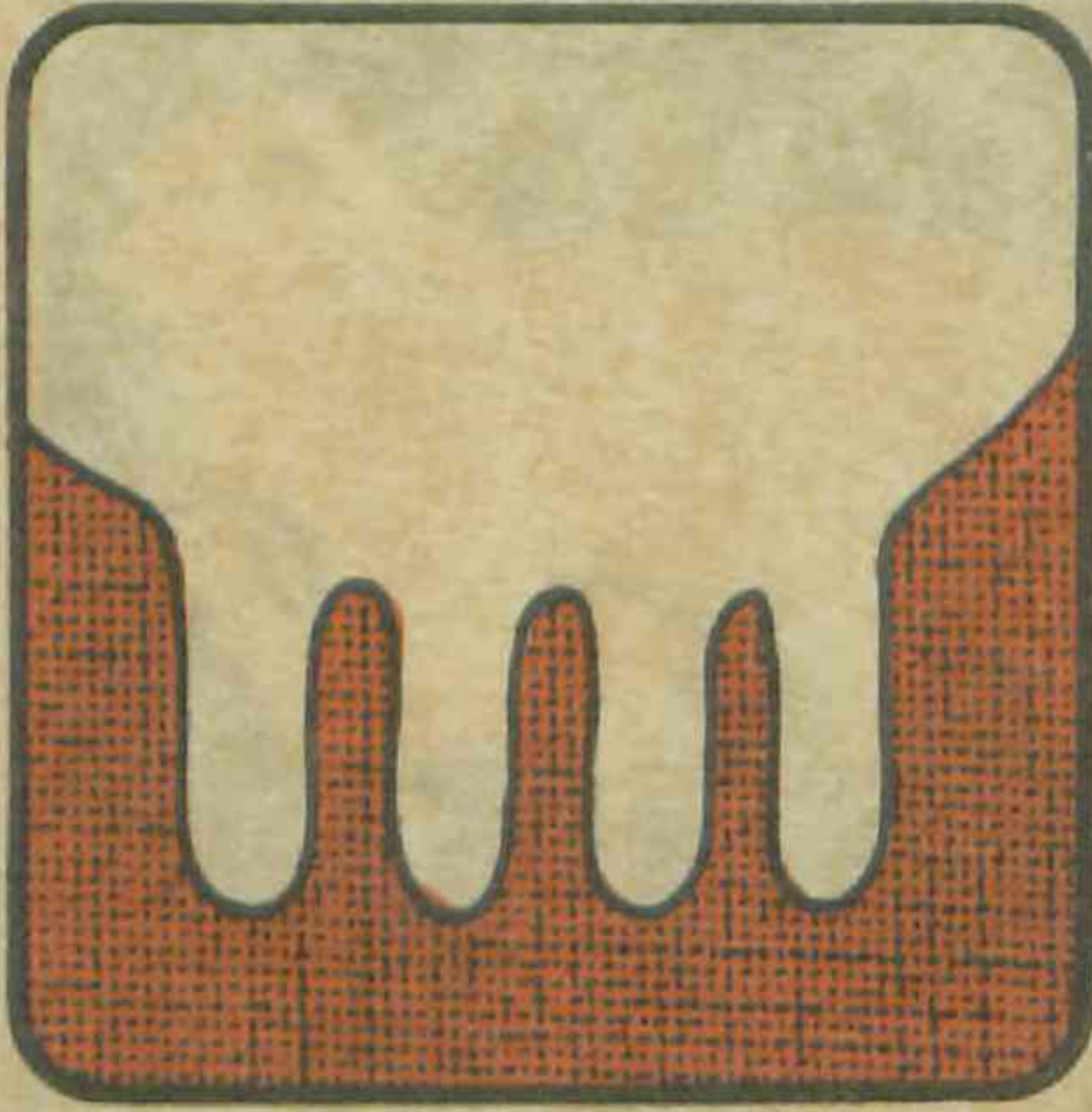
Queensland egg production for 1983-84 was estimated at just over 36m dozen, similar to 1982-83. Continued over-production and instability in the organised marketing structure, particularly in southern States, caused uncertainty in the industry.

Despite a surplus of eggs in 1982-83 and severe quota reduction in 1983-84,



surpluses were still exceeding planned levels in Queensland.

Egg sales by the South Queensland and Central Queensland Egg Marketing Boards were estimated at 1% below those of 1982-83. The introduction on 8 May 1984 of new egg grades and cartons in south-east Queensland was expected to lift sales.



The dairy industry

Milk production for the year was expected to be up by about 13% on the previous year's, reflecting the generally favourable seasonal conditions and sound farm-management practices; but sales of market milk—including pasteurised, flavoured, modified and long-life—were expected to be similar to those of 1982-83. Butter production increased by 60%, cheese by 3% and milk powder by about 20%. Butter production was the highest for 5 years. The production increase coincided with an Australian production increase of about 7%—at a time when the world market is oversupplied with dairy produce.

Average Australian farm-gate returns in 1983-84 were expected to be 40 to 50c below the 1982-83 figure of \$3.80/kg milk fat. The average return for whole milk for Queensland producers fell from 23.1c/L to 22c/L.

The Industries Assistance Commission heard submissions on long-term proposals for the dairy industry and recommended that all milk be levied to fund a 20% subsidy on exports. The Australian industry prepared a national marketing plan to meet some of the IAC proposals. The industry also proposed an entitlement scheme to contain and even reduce milk production to an acceptable level.



Deer farming industry

Deer farming is a growth industry in Queensland: 54 registered deer farmers were farming about 5 000 deer. The sale of locally produced venison to the restaurant trade was expanding, while velvet prices remained satisfactory.

The fishing industry

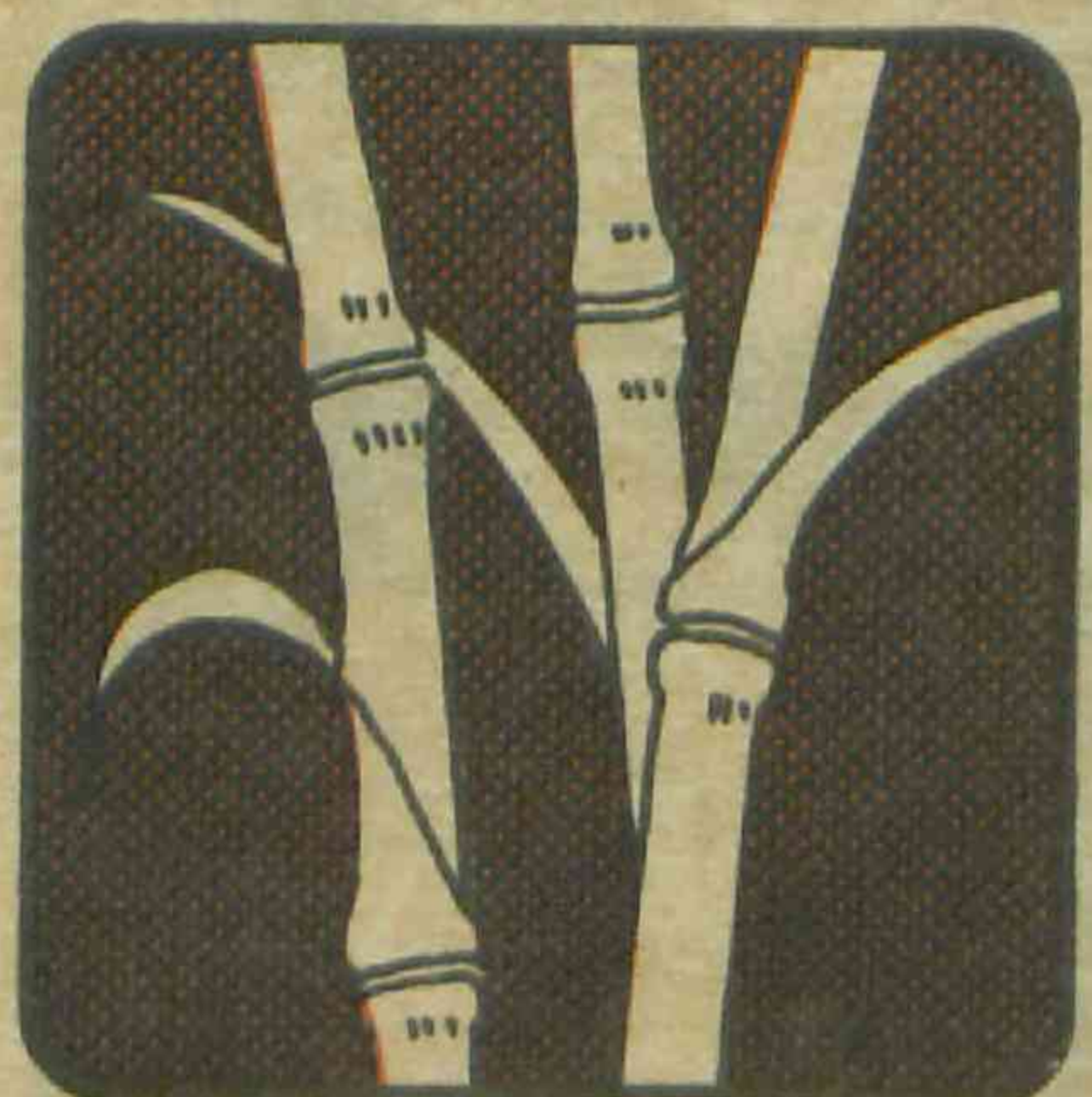


Overall, yields from the main segments of the fishery were slightly above average, but cost increases, mainly for fuel, prevented improved financial returns. Production in the finned-fish sector appeared to return to normal levels, particularly in the northern mackerel fishery. Marketing legislation introduced with the *Fishing Industry Organisation and Marketing Act* should provide a more stable market.

Programmes introduced in 1980 to control activity in the fishing industry and to manage the State's fisheries continued. These have stabilised the number of licensed fishermen at 2 400 and vessels operating in the major otter-trawl prawn fishery at 1 300.

The Queensland Fish Management Authority's role as the State's main fisheries management agency became more clearly defined. The Authority was functioning in a number of areas in response to industry demands. About 1 000 marketing licences were issued throughout the State, and industry liaison improved to the extent that the Fish Promotion Advisory Committee was constituted early in 1983-84.

The sugar industry



Queensland's 1983 sugar crush was completed on 30 December when the last of the State's 22.7m t of cane was crushed. The 1982 crush was 23.1m t. However, the sugar content of the crop was well below the previous season's, with the average c.c.s. reaching only 13.01 units compared with 14.15 in 1982. This reflected 1983's relatively poor growing conditions, drought in the early part of the year, and wet conditions hampering harvesting later in the season.

Slightly more than 3m t of sugar was produced from the 1983 crop. On average, about 7.5 t of cane was needed to produce 1 t of sugar. In 1982, the more normal ratio of 7 t of cane to 1 t of sugar produced 3.3m t of sugar.

After almost a year of depressed prices, the market began to improve in April 1983. Prices began to fall again in August, falling steadily from \$300/t to \$160/t on the London market. Consequently, returns to Queensland sugar producers were severely depressed again in 1983-84.

Negotiations to formulate a new ISA took place during 1983. The United Nations Sugar Conference held two negotiating sessions in Geneva during May and September. A further session was due in June 1984 and it was hoped that this

session would result in a new charter acceptable to all countries represented.

The current 5-year Commonwealth-State Sugar Agreement was due to expire on 30 June 1984. Negotiations, involving the industry and the Commonwealth and Queensland governments, about a new agreement were in progress at the year's end.

The wheat industry

Queensland produced about 1.9m t of wheat in 1983-84, close to the previous record and more than double the previous year's 728 000 t. The national crop approached 22m t, a record level, but about one-third was downgraded because of wet weather during harvest. Significant crop damage in Queensland resulted in only about 50% being classified Prime Hard, or No. 1. Hard, compared with 83% in 1982-83.

Australian exports were expected to exceed 15.5m t in 1983-84, an all-time record and 19% above the previous record set in 1979-80. Only 5m t were exported from the drought-affected 1982-83 crop.

The guaranteed minimum price was set at \$150/t for ASW wheat compared with \$141.32/t in 1982-83. Net returns to growers for ASW wheat were likely to be below \$120/t for the year. The Australian Wheat Board experienced some difficulty in selling the crop at profitable prices. The Board expected to carry forward substantial stocks into next season.

The barley industry

The 1983-84 barley season resulted in a record harvest after two drought-affected crops in the previous three seasons. Despite about 25 000 t being lost through hail damage, production totalled 596 000 t compared with 210 000 t in 1982-83. Average yields in 1983-84 were 2.09 t/ha compared with 1.55 t/ha the previous season.

The Barley Marketing Board received 440 000 t compared with 140 000 t in 1982-83. It was the highest receipt since 1978-79. Some 68 500 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 \$110/t was paid on all deliveries to the Board compared with \$115/t for the previous pool.

About 34% 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 \$113.78/t for feed grade to \$135.95/t for malting grade. Growers delivering to the pool elected to cash out about 30% of the net pool tonnage. These cash-out payments ranged from \$3.90 net/t for feed grade up to \$26.71 net/t for malting grade. The Board again expected to be able to finalise this year's pool within 12 months.

The grain sorghum industry

Grain sorghum plantings in the 1983-84 season were estimated at 600 000 ha, about 13% higher than in 1982-83. Production was expected to reach 1.35m t, a major increase over the previous season's drought-reduced crop of 750 000 t. On a regional basis, central Queensland production, including that from the Upper Burnett, was estimated at 410 000 t compared with only 200 000 t in 1982-83. In the State's southern growing areas, production was estimated at 940 000 t compared with 560 000 t in 1982-83.

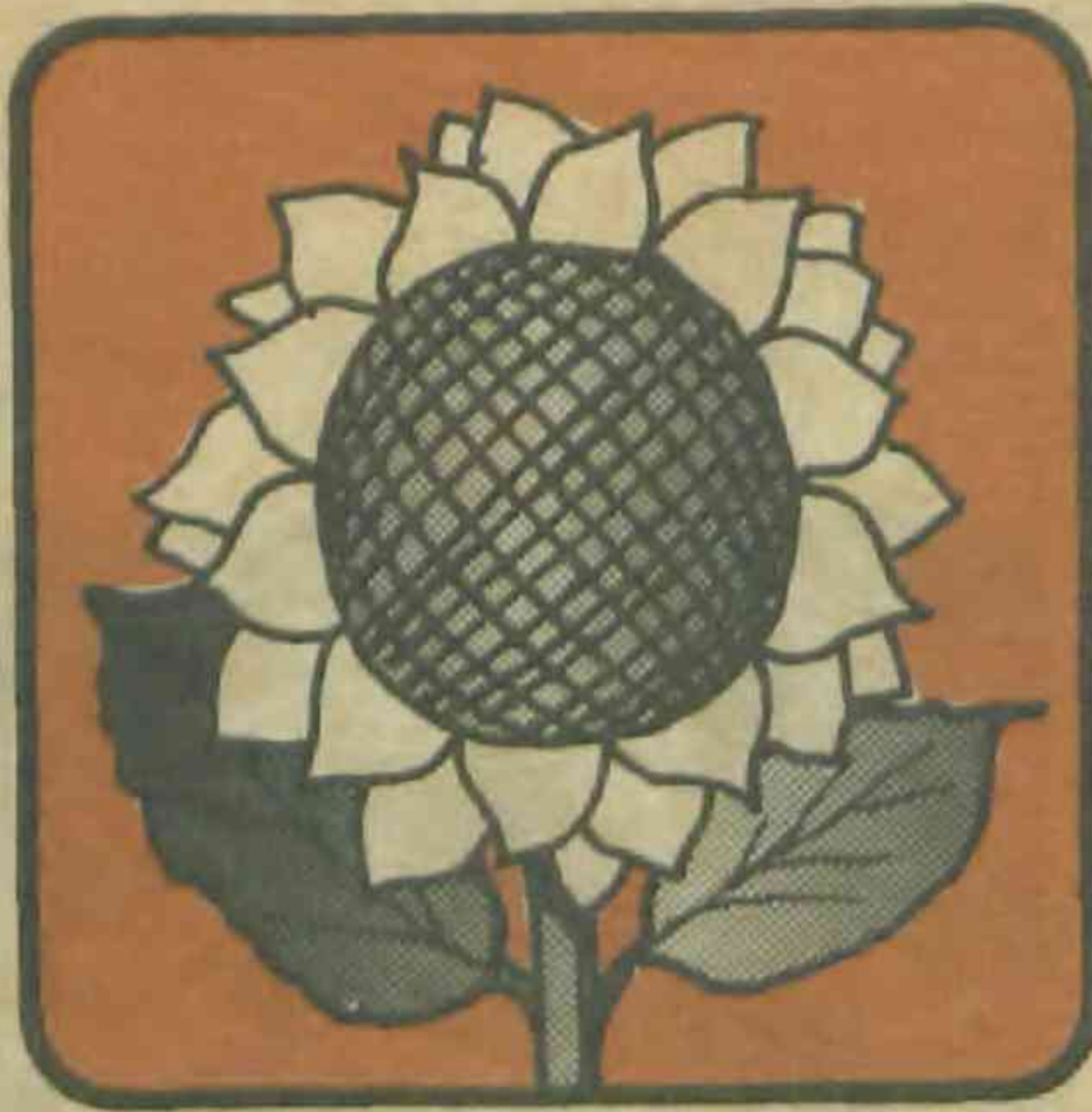
Returns to growers from the 1983-84 crop handled by the Central Queensland Grain Sorghum Marketing Board were expected to be lower than the average 1982-83 pool price of about \$128/t.

The maize industry

Maize production in 1983-84 was expected to total 186 000 t, more than double last year's drought-affected crop. Good growing conditions in most districts resulted in above-average yields.

On a regional basis, production was estimated at: 60 000 t from the South Burnett (16 700 t in 1982-83), 28 500 t from the Central Downs (19 400 t in 1982-83), 28 500 t from the Atherton Tableland (12 600 t in 1982-83) and 69 000 t from other areas of the State (38 700 t in 1982-83).



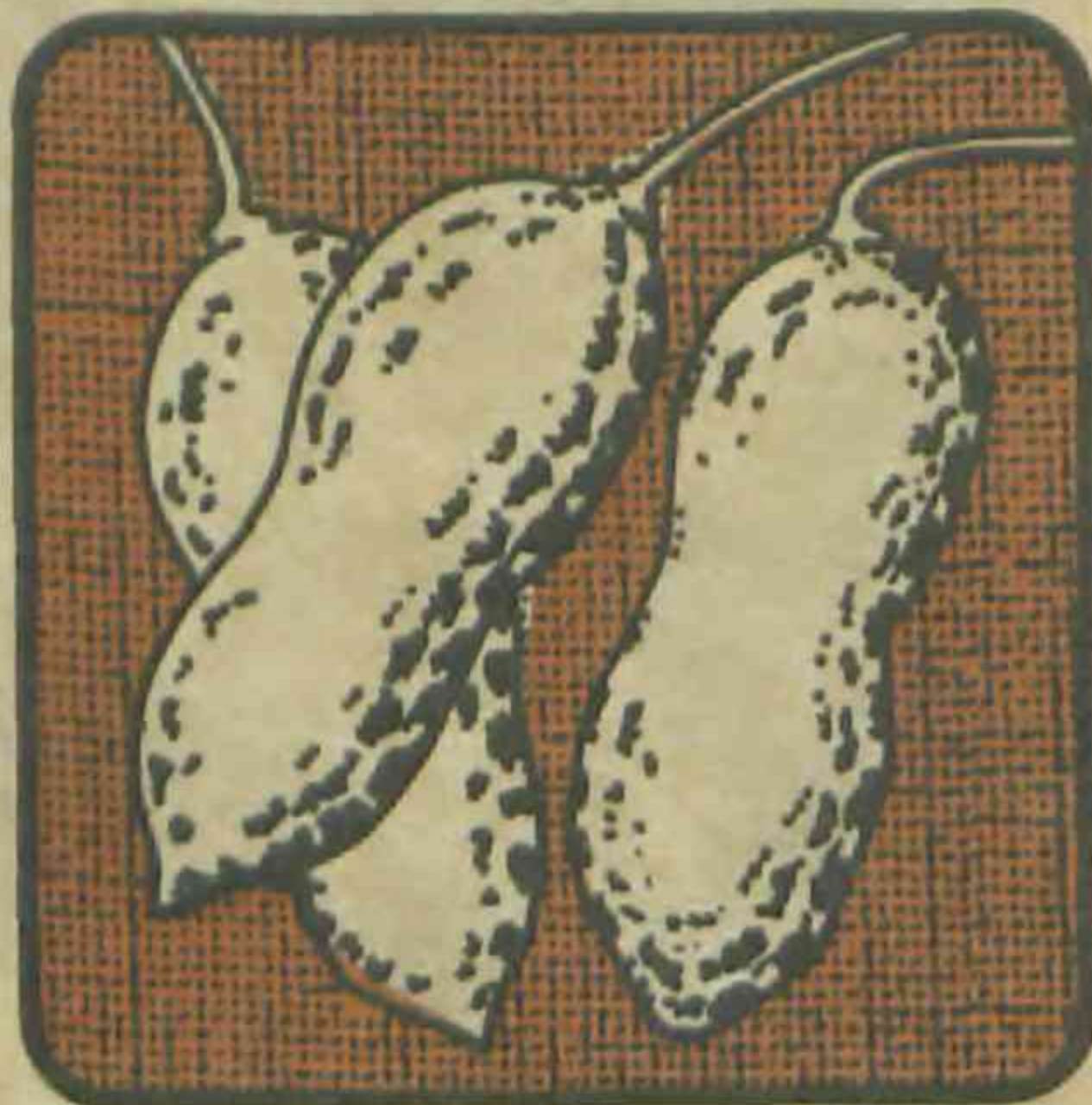


The oilseeds industry

Sunflower plantings increased to about 150 000 ha in 1983-84 from a low 120 000 ha in 1982-83. Prices were about \$280 to \$300/t on farm in March 1984, considerably higher than the previous year's \$230/t. Prices were good on the international oil market. This should continue to have a buoyant effect on sunflower prices.

Plantings of soybeans were slightly higher than the previous year's plantings, reaching about 33 000 ha. Wet weather caused some delays at planting, but most areas experienced good growing conditions. Soybean prices were about \$260/t on farm in March 1984, slightly lower than the previous year's level.

Safflower plantings of 28 000 ha were substantially higher than the previous year's drought-affected level, and production increased dramatically to about 24 000 t. Linseed production was again small, with less than 250 ha being planted.



The peanut industry

Favourable weather and apparent shortages in some export markets raised growers' expectations of good returns after the disastrous 1983 season. Nevertheless, the area sown was down from the 1983 level of 36 500 ha to an estimated 32 500 ha, due partly to the industry's difficulties, including growers' cash-flow problems. However, good growing conditions throughout the State meant that total production could reach 50 000 t in 1983-84 and that crop quality would be improved.

Grower expectations that returns would improve in 1984 seemed to be ill-founded. Export markets did not appear to be as remunerative as anticipated and the threat of imports had depressed prices on the domestic market.

The traumas of 1982-83 continued to influence the industry in 1983-84, mainly because of a dispute about the operations of the Peanut Marketing Board and the orderly marketing system which it represents, and 'independent' shellers.



The navy bean industry

The year was disappointing for Queensland's navy bean industry. Early in the season, growers indicated that they would sow about 8 500 ha. But, because of hot, dry conditions in the major growing districts during the main planting time, only 6 000 ha were finally sown. Conditions remained dry throughout most of the season until late April 1983 when flood rains deluged the State. These rains, together with further downpours in May, devastated the drought-affected navy bean crops. About 1 000 t (estimated clean weight), or about 65% less than the previous year, were produced.

The Board paid a first advance of 45c/kg on canning-grade beans and 55c/kg on approved seed. A residual payment of at least 20c/kg was expected. A 'cash-out' option of 12.25c/kg in lieu of 14c/kg was also offered on canning-grade beans.

Plantings for 1984 were estimated at about 6 000 ha. Most of the summer-sown crops developed well and, assuming average to slightly above-average yields for the small winter and spring plantings, total production for the year was likely to be about 5 000 t. The Navy Bean Marketing Board announced a first-advance payment of 45c/kg for canning-grade beans from this crop.



The rice industry

Production from the two 1983-84 rice harvests was expected to reach about 21 000 t, only marginally below the previous season's. The summer rice harvest was 10 800 t, with the Burdekin district supplying 8 000 t and Mareeba the balance. Yields in both areas were good and millouts were above average.

The 1984 winter harvest was expected to produce about 10 000 t, comprising a record 6 500 t from the Mareeba district and about 3 500 t from the Burdekin. Above-average grain quality was expected from both districts.

The short-term marketing outlook had deteriorated somewhat, because of increasing pressure from low-priced imports that had depressed the local market. The world market was still oversupplied, keeping export prices relatively low.

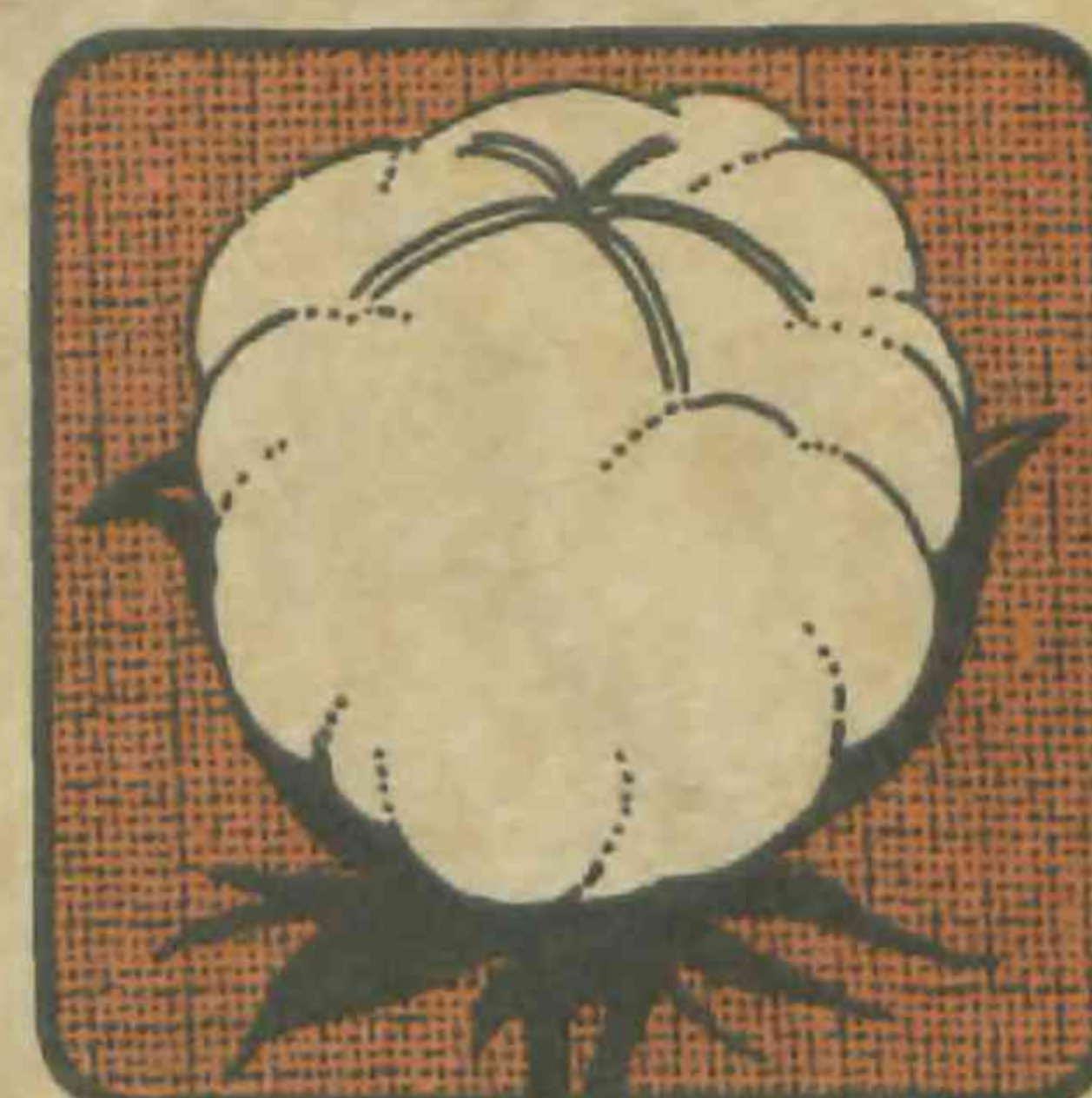
The cotton industry

Queensland's production of ginned lint cotton for the 1983-84 season was expected to reach a record 160 000 bales, more than 45 000 bales above the previous season's near-record output. The largest expansion of cotton production was again on the Darling Downs, but the St George district and the Emerald Irrigation Area both had significant increases.

In central Queensland, improved weather conditions during the growing period aided productivity. In particular, crop yields in the Emerald Irrigation Area increased significantly, averaging 5 bales/ha. On some farms, yields were as high as 7 bales/ha. Ginnings were also of very good quality. Elsewhere in central Queensland, yields and quality were good to excellent.

Bad weather in parts of southern Queensland, especially on the Darling Downs, hampered land preparation and planting, causing the crop to be late. Nevertheless, a significant improvement, compared with last season, occurred in both yield and cotton quality.

Export sales were expected to reach a record 141 500 bales, with Japan and the Republic of Korea being the major market outlets.



The fruit and vegetable industries

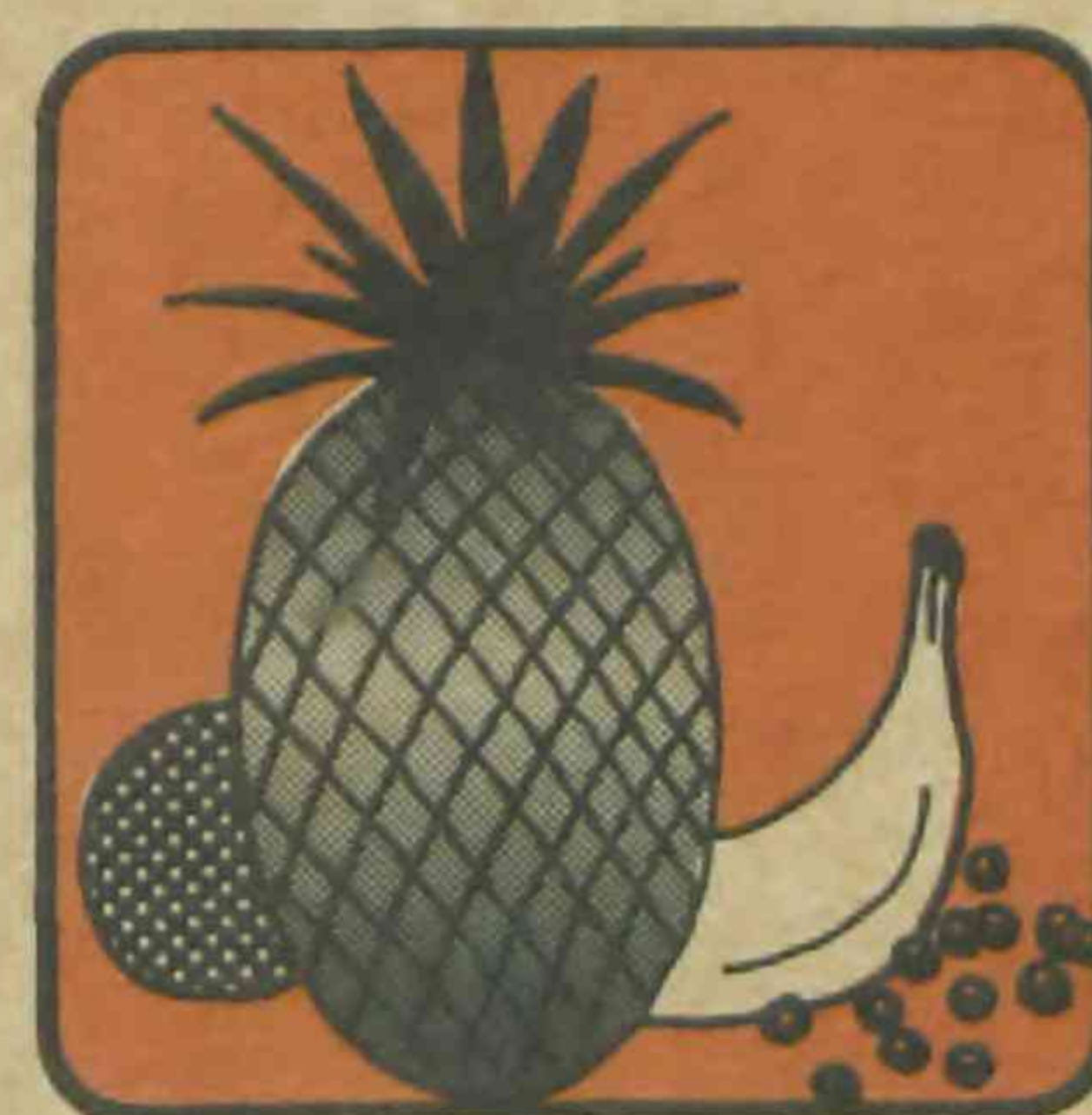
The physical output of most horticultural crops was considerably above last year's levels. However, in some industries, lower prices offset the higher production levels. The estimated gross value of production for horticultural crops was \$339m in 1983-84 compared with \$280m in 1982-83.

The Granite Belt's 1984 **apple** crop was estimated at 1.272m 18kg cartons—the lowest production since 1981 and considerably below the 1979 record crop of 2.158m cartons. The 1984 **apple and pear** crop was estimated to be worth \$19m, and **stone fruit** and **grape** production, about \$10m.

With annual production exceeding 61 000 t, Queensland is now Australia's major **banana**-producing State, with 1983-84 production estimated to be worth \$43m. Its **pineapple** production was estimated to be worth \$31m and its **citrus** production, \$19m.

The value of production of Queensland vegetable industries (including tomatoes) was estimated at \$198m, up some \$30m on last year, reflecting substantial increases in production in some industries.

After a 20-year battle to overcome quarantine barriers, Queensland citrus growers exported the first Australian citrus to Japan in September 1983. Many negotiations and experimental trials relating to fruit-fly control preceded the initial shipment. A follow-up shipment of about 11 000 cartons of navel oranges was made in June 1984.



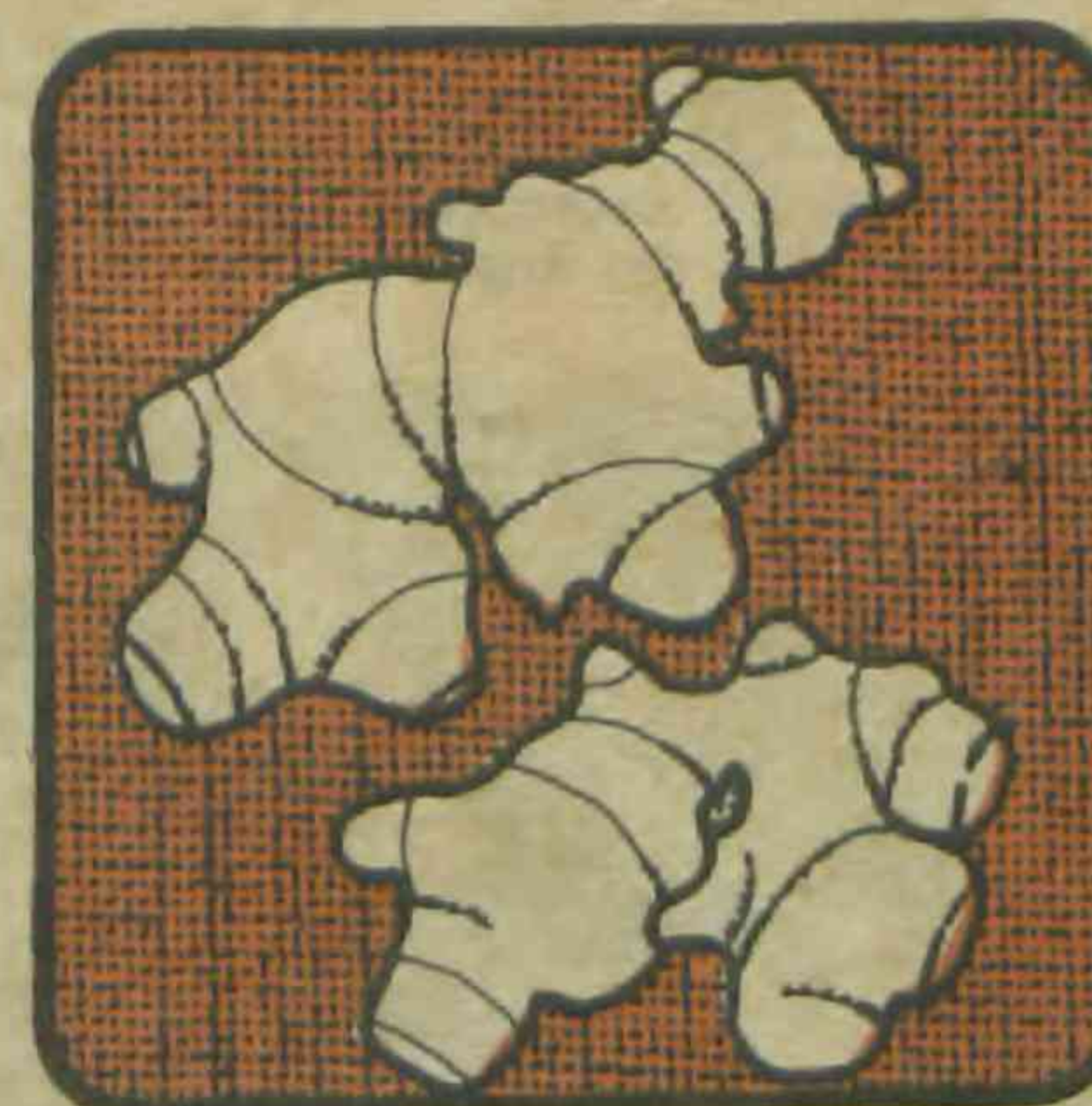
The ginger industry

Intake by the Buderim Ginger Growers' Co-operative Association Limited in the 1983 season was 2 334 t, well down on the previous season's 6 038 t. This reflected the industry's decision to reduce production to alleviate the Association's overstocked position in some ginger products, caused by the downturn on the world market.

The tobacco industry

Tobacco sales to the end of May 1984 accounted for 73.7% of the 1984 State marketing quota of 7.533m kg at an average price of 506.9c/kg, 19.4c/kg above the minimum average reserve price of 487.5c/kg. The Mareeba-Dimbulah district fared particularly well, averaging 508.2c/kg. The total value of tobacco-leaf production for the 1984 selling season was expected to be more than \$35m.

Restructuring of the growing sector continued, with further quota moving from southern growing areas to the Mareeba-Dimbulah areas. Few quotas remained in the Inglewood and Bundaberg areas. Increased upper limits on farm build-up assisted restructuring. Interstate transfer of quota was imminent and some New South Wales quota was expected to move to north Queensland.



Animal industry highlights

The meat industry

Although the industry downturn affected Queensland less than other states, Mareeba and Roma abattoirs remained closed. Biloela, Maryborough and Huttons (Brisbane) closed for part of the year but later reopened under new ownership. After change of ownership, works at Rockhampton and Dinmore closed, with reopening subject to industrial-award ramifications. The export industry was still concerned about excess capacity and viability. In contrast, small domestic works generally were busy, being able to process at a lower cost.

Working relationships between State and

Commonwealth inspection services steadily improved. State officers participated in training and accreditation of export inspection service trainers for implementing new export trade descriptions. Export inspection service staff became involved in supervising application of consumer identification brands in export boning rooms. **Monitoring** of the consumer meat-identification system was improved; research into ways of improving attractiveness of brands was a priority.

The meat quality section of the DPI's Veterinary Public Health Branch convened a working group, representative of the pig industry, to develop a code of practice for handling animals from farm to slaughter. The code was being published.

Random testing of meat samples for species of origin was carried out through the year. Samples were collected from retail meat outlets, small-goods manufacturers and some pet-food stores. None of the samples (about 1 000) contained unacceptable meats. Kangaroo and horse meats were detected only in pet foods.

Economic problems continued in the pet-food industry. An industry consultative group was set up.

A number of State officers were authorised as officers under Commonwealth regulations to help control export game meat.

The cattle industry

New developments in beef-cattle marketing emphasise the importance of correct fat cover on the animals. The accuracy with which producers and agents can assess this fat cover is important for efficient marketing. Live-animal assessment schools train producers and agents to assess fat cover on live animals. After the animals have been assessed, they are slaughtered and fat cover is checked against each assessor's estimates. This school in Toowoomba was organised by the DPI.

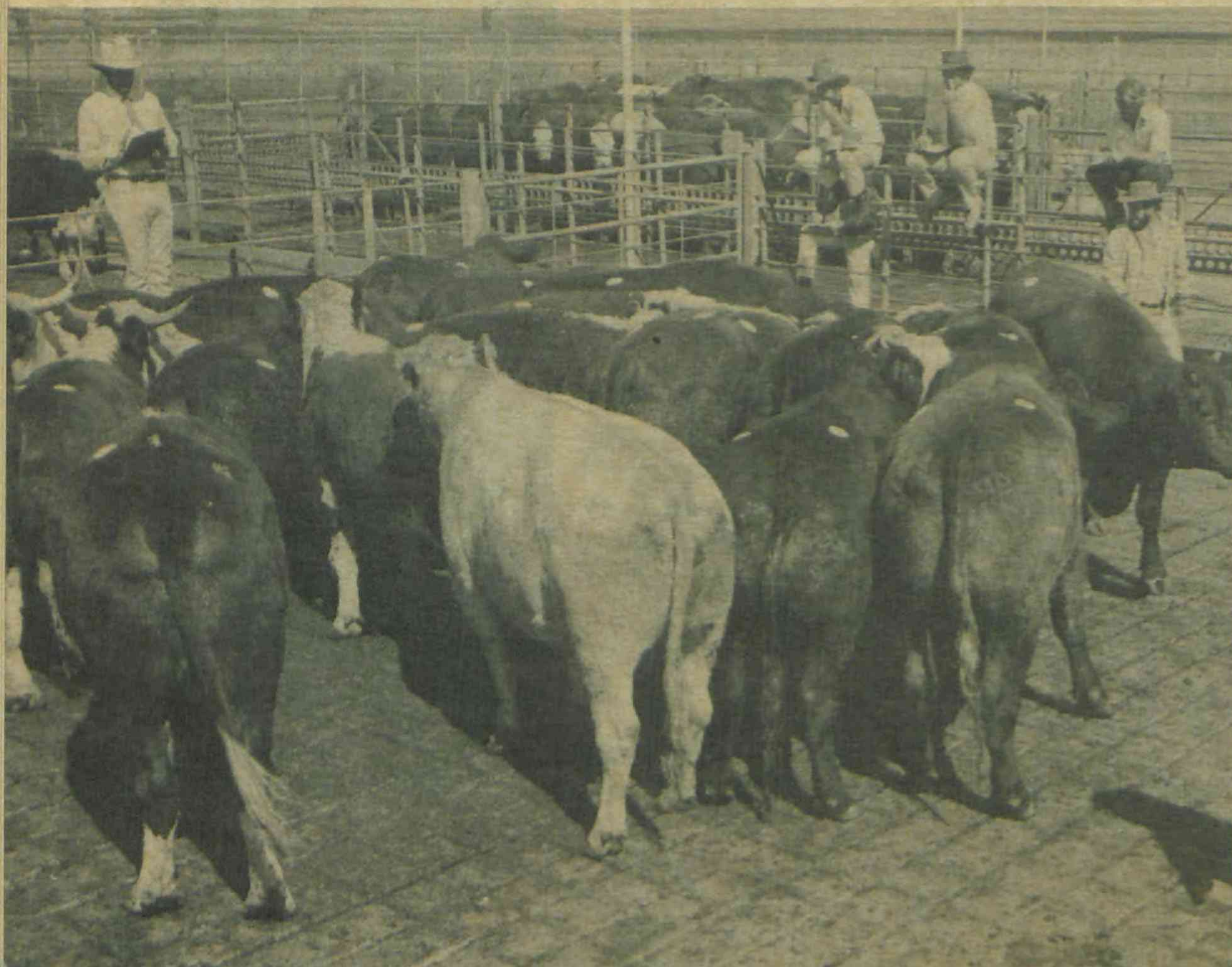
Three beef-production seminars were conducted at Clare, Mt Isa and Longreach for the managers of pastoral-company properties. The seminars were a new communication initiative between the DPI and cattle managers on the large and remote properties of the west and north, and will be a permanent extension activity.

Animal appraisal and marketing courses were conducted for stock and station agents, in association with the Queensland Agricultural College and the Livestock and Meat Authority of Queensland. More than 100 livestock agents participated.

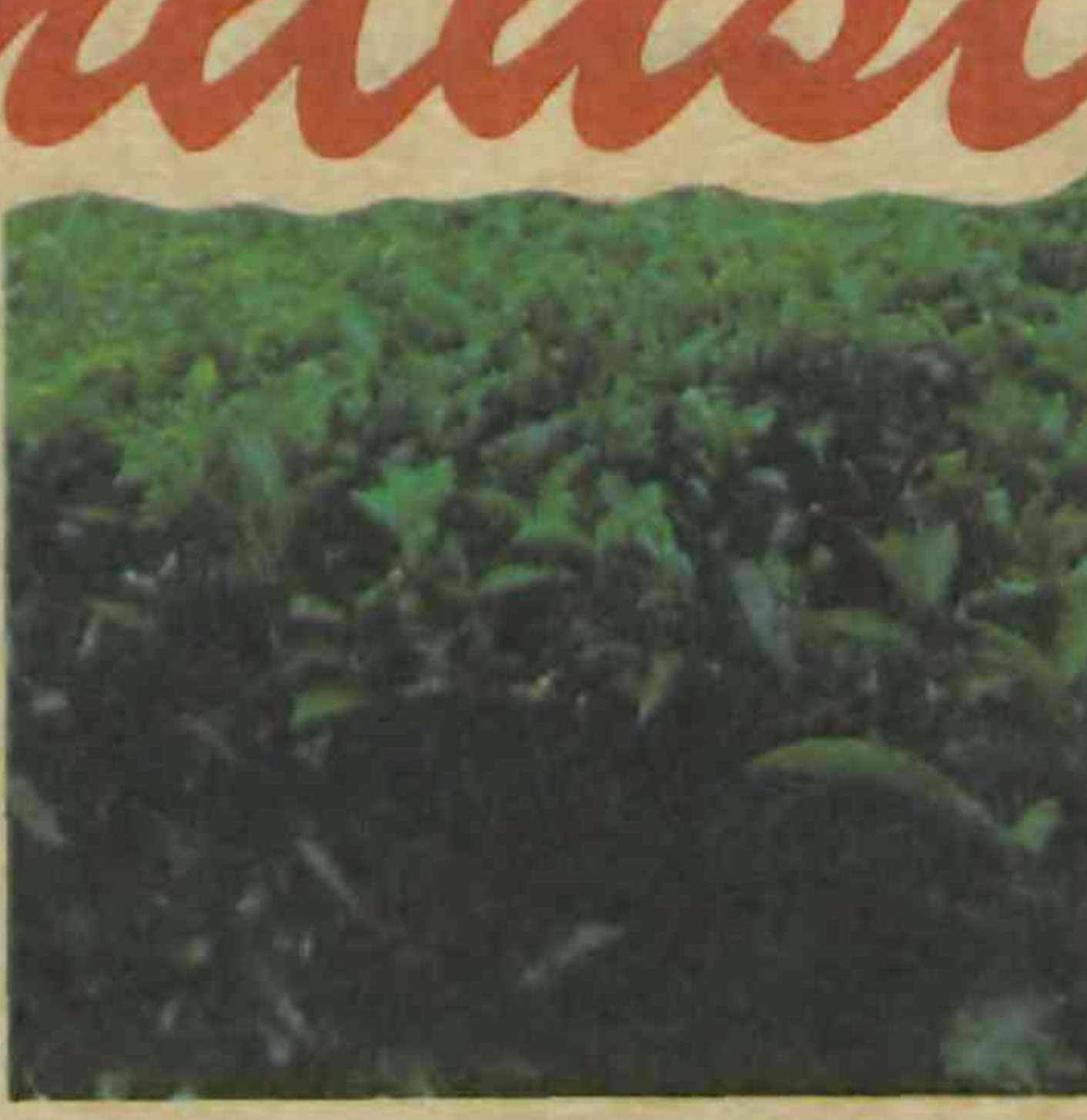
Volumetric loading of multi-deck stock crates was introduced. This allowed vehicles that conformed with required safety and mechanical standards to be exempt from weighing. The result was cheaper and quicker transport of livestock to markets, saving producers and the industry thousands of dollars. Additionally, volumetric loading allowed double-deck cattle transports to deliver cattle to Cannon Hill saleyards. This reduced transport charges to Cannon Hill and increased the numbers of cattle sold through there, thus keeping the saleyard viable as a market option for producers.

Stock poisoning

The value of cattle dying of plant poisoning in Queensland between 1972 and 1981 is estimated to average about \$10m annually (in 1981 values). This value does not include the cost of reduced production of cattle recovering from poisoning, the



Queensland Primary Industries



1 These tea hedges near Innisfail produce up to 3 000 kg/ha of good quality black tea. The value of tea produced at the farm gate in far north Queensland in 1983 is estimated at between \$750 000 and \$1m.

2 A commercial mud crab fisherman working in Broad Sound north of Rockhampton holds one of his catches. The DPI is carrying out estuarine surveys in Broad Sound to identify habitats suitable for fish reserves.

3 An automatic urea dispenser for adding supplements to the drinking water of cattle is being tested at the DPI's Swan's Lagoon Cattle Field Research Station near Ayr. Supplementation studies are an important part of the Swan's Lagoon research programme.

4 Grimmatt, a malting barley released for commercial production in 1982, was planted to 64% of the State's barley area in 1983.

reduced land use because of the presence of poisonous plants, and the costs of treatment and control measures.

Cattle seem to enjoy eating the larvae of the sawfly (*Lophyrotoma interruptus*). The larvae contain a toxin that rapidly damages the liver. Between 1972 and 1981, the estimated value of cattle lost from eating sawfly was \$100 000 annually, with control measures and costs of reduced land usage amounting to an additional \$1m annually. The rapid, irreversible onset of pathological changes rules out using antidotes in the field. The only satisfactory control measure available is the clearing of silverleaf ironbark, the main food tree of the sawfly.

Seven instances of arsenical poisoning were recorded. The most serious resulted in the loss of more than 100 cattle after arsenic trioxide was applied from a wrongly labelled container bought at a sale.

Brucellosis and tuberculosis

Satisfactory progress was maintained in tuberculosis and brucellosis eradication. The DPI expected to meet the 1992 target date for freedom from both diseases. It also expected that Queensland would meet the requirements for provisional freedom from brucellosis by 30 June 1984 and for tuberculosis by 1 January 1985.

Serological testing for brucellosis of nearly 1m sera obtained at slaughter during field operations (1 619 reactors) resulted in the number of herds classified as negative or free increasing by 1% to 32 320. Another 131 properties, or 0.4% of the total, were provisionally clear.

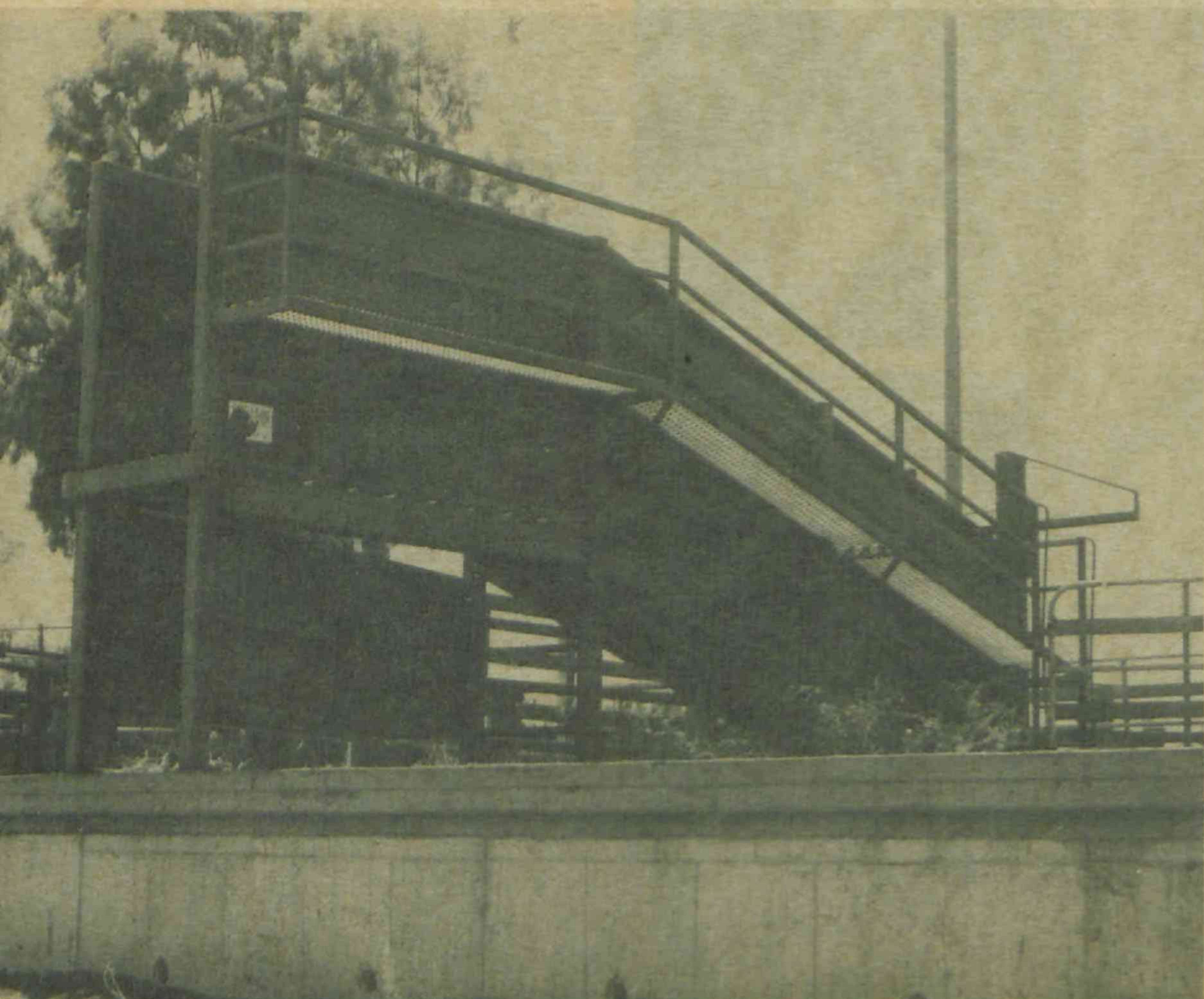
Active eradication programmes for tuberculosis were operating on the 208 infected and quarantined properties. Most are in remote areas, where eradication is slow, difficult and largely dependent on destocking.

Destocking of the Queensland section of the Simpson Desert National Park was undertaken during November-December 1983; helicopters were used and 261 feral cattle were destroyed. Destocking was necessary to protect properties that had undertaken costly BTB eradication programmes from reinfection from feral cattle in the desert.

Enzootic bovine leucosis (EBL)

The prevalence of EBL is to be progressively reduced to a level that allows total eradication at some future time. To support this policy, the DPI established an EBL accreditation scheme. Initially, the scheme focused on stud herds, but applications from commercial herds were being considered. About 220 herds involving about 25 000 cattle were tested; results showed that 76% of herds and 14% of cattle were infected.

Good handling facilities reduce the risks of injury and stress to cattle during transport. Such facilities help improve meat and carcass quality, and should mean more dollars to the producer. This double-deck loading ramp at Roma allows both decks of a cattle transport to be loaded at the same time with minimal stress and bruising.



The sheep industry

During February and March, conditions over much of Queensland were ideal for a fly wave. Strikes of between 20 and 50% were reported from many properties. Difficulty in obtaining insecticides hindered control. Internal parasite numbers increased, but treatment controlled them. One development was the increase in *Trichostrongylus* spp. during the late summer on properties that used a highly efficient narrow-spectrum drench.

A lice-control problem became evident with the use of Vetrizin as a fly insecticide. When organo-phosphates were used as the jetting fluid, all jetted sheep automatically received a midseason treatment against lice. However, Vetrizin does not control lice; so separate treatment is necessary.

A film entitled *Three Costly Days* was released. Financed by the Wool Research Trust Fund, it deals with the primary sheep blowfly (*Lucilia cuprina*), describing its life

cycle, its costs to industry and methods of control, and emphasising the need for timely control.

Twelve schools on control of internal parasites were held in southern Queensland. Producers were taught to do their own tests for faecal worm egg counts. Some 210 were trained and about 50% bought equipment to do the test.

Monitor flocks were established in the Roma, Cunnamulla, Blackall, Barcaldine and Julia Creek districts in an effort to improve net reproductive rate of sheep. Producers were encouraged to collect performance data on their own flocks. A recording card was designed and distributed in central and northern Queensland.

Improvement in the nutrition of pregnant and lactating ewes, by providing nitrogen in the drinking water, was promoted in central and northern regions. Some 8 to 10% of producers had adopted the technique.

Baling and fortification of pasture hay were promoted to improve weaner survival. In north-west Queensland, at least 39 graziers were producing their own pasture hay.

The pig industry

Imported and local pig breeds continued to be evaluated in boar-performance tests at the DPI's Pig Testing Station, Rocklea. Sufficient imported Durocs were evaluated to obtain a significant estimate of performance. Canadian Yorkshires and Durocs outperformed local breeds in both economy of production and carcass traits.

The first positive field isolation in Australia of the mycotoxin, vomitoxin, was obtained at Beaudesert, after the harvest of weather-damaged winter cereals. The fungus *Fusarium graminearum* produces vomitoxin, and toxicity in pigs is characterised by feed refusal, vomiting and oestrogenic effects. Controlled investigations with pigs were in progress.

Meatworks surveillance of baconers for melioidosis resulted in cases of the disease being detected in southern Queensland for the third successive year. Several intensive piggery units at Mundubbera and Gayndah were again involved. However, affected pigs were fewer than in 1982, apparently because chlorination equipment had been installed. Sampling of river water and soil at Mundubbera had not detected the causative bacterium *Pseudomonas pseudomallei*. Epidemiological investigations were continuing to identify the source of infection.

The poultry industry

Egg producers were emphasising economic factors in decision making. This trend had led to greater adoption of record keeping in the industry and an increased demand for economic advice from the DPI.

Equitable reward for performance is of great concern to chicken growers in a pool payment system. Alternative payment schemes were evaluated by DPI staff.

A severe outbreak of infectious laryngotracheitis (ILT) occurred in south-east Queensland, during the mild winter of 1983. The disease was diagnosed on 25 egg-producing farms and 12 meat-chicken farms. Significant economic loss occurred in the egg and chicken-meat industries before a combination of quarantine and vaccination contained the outbreak.

Research in animal industries

The DPI carried out extensive testing of growth promotants in beef cattle. The tests confirmed claims for efficacy. With DPI endorsement, these compounds were widely used. They can be expected to increase growth rate under favourable conditions by 10 to 15%.

Advanced statistical methods were being used in two projects to improve the genetic merit of Queensland's grazing flocks and herds. One project was comparing a range of statistical techniques to select the most appropriate components for estimates of variance and applying these estimates to a

The welfare of cattle transported to abattoirs has received much research attention. During the resting period before slaughter, there seems to be some advantage in feeding cattle with feeds as diverse as rice straw and lucerne hay. Losses in carcass weight increase as the total time between mustering and slaughter increases. Losses of about 0.4% a day can occur. While resting, cattle should not be disturbed by noise or other abattoir activities, or mixed with unfamiliar cattle. They should stay on water until slaughter.



set of sheep-breeding data collected in north-west Queensland. The other project was comparing reproductive and growth parameters for Sahiwal and Brahman crossbred cattle.

A programme to test the effect of new stylosanthes legumes on beef cattle productivity was well advanced on five private properties. This work complements research-station results and will be extended in 1984-85.

Experiments to determine if pasteurisation killed enzootic bovine leucosis virus in milk demonstrated that the virus was destroyed when samples were heated to 60°C for 30 minutes, conditions equivalent to the pasteurisation process of heating to 73°C for 15 seconds. Further testing was in progress with large volumes of milk heated to 73°C for 15 seconds.

A survey showed that *Stephanofilaria*, a small worm that lives part-time in the skin of cattle causing irritation and damage to the hide, was present in 5% of cattle in south-east Queensland but in 94% in Cape York Peninsula. The prevalence increased with the age of cattle. The most commonly infected were old *Bos taurus* cattle. Research had indicated that the lesions were caused by the worm being transmitted by the buffalo fly.

An important aspect of bovine tuberculosis eradication is to define 'safe' periods between the destocking of infected areas and their restocking with non-infected cattle. In Europe, the causal organism *Mycobacterium bovis* can survive in the environment for up to 2 years. In the Townsville area, the survival of *M. bovis* was tested in dry soil, moist soil and bovine faeces under various conditions of light and temperature to simulate natural exposure. The organism survived for 4 weeks in soil kept in the shade or dark, but not in full sunlight, suggesting that the 'safe' period for natural conditions in north Queensland is unlikely to exceed 8 weeks.

Studies indicate that toxins in plants eaten in sub-lethal amounts by pregnant ewes may harm foetal development, jeopardising survival of newborn lambs. The toxins may be present in broad-leaf species normally grazed by sheep during late pregnancy. The effect of these plants on lamb survival was being investigated in grazing experiments.

The poisoning of sheep by yellow daisy (*Wedelia asperima*) was studied. The toxin caused extensive liver necrosis in sheep. The median lethal dose was 1 g of dried plant/kg liveweight.

Injection of methionine into sheep had resulted in a 30% increase in wool production. DPI scientists were investigating practical ways of supplementing grazing animals.

The air mist spray race, developed in conjunction with the Ithaca College of Technical and Further Education, was field evaluated as an improved method of insecticide application to control external parasites. The concept of air as the carrier of the insecticide at controlled flow rates proved successful. Of 6 355 sheep treated through the race, 0.08% were struck by blowflies compared with 7.6% strike (and 0.8% deaths) in 3 137 untreated sheep.

Work continued on clarifying the action of epidermal growth factor (EGF) as a defleecing agent. Research was aimed at reducing the EGF dose required to achieve optimum defleecing.

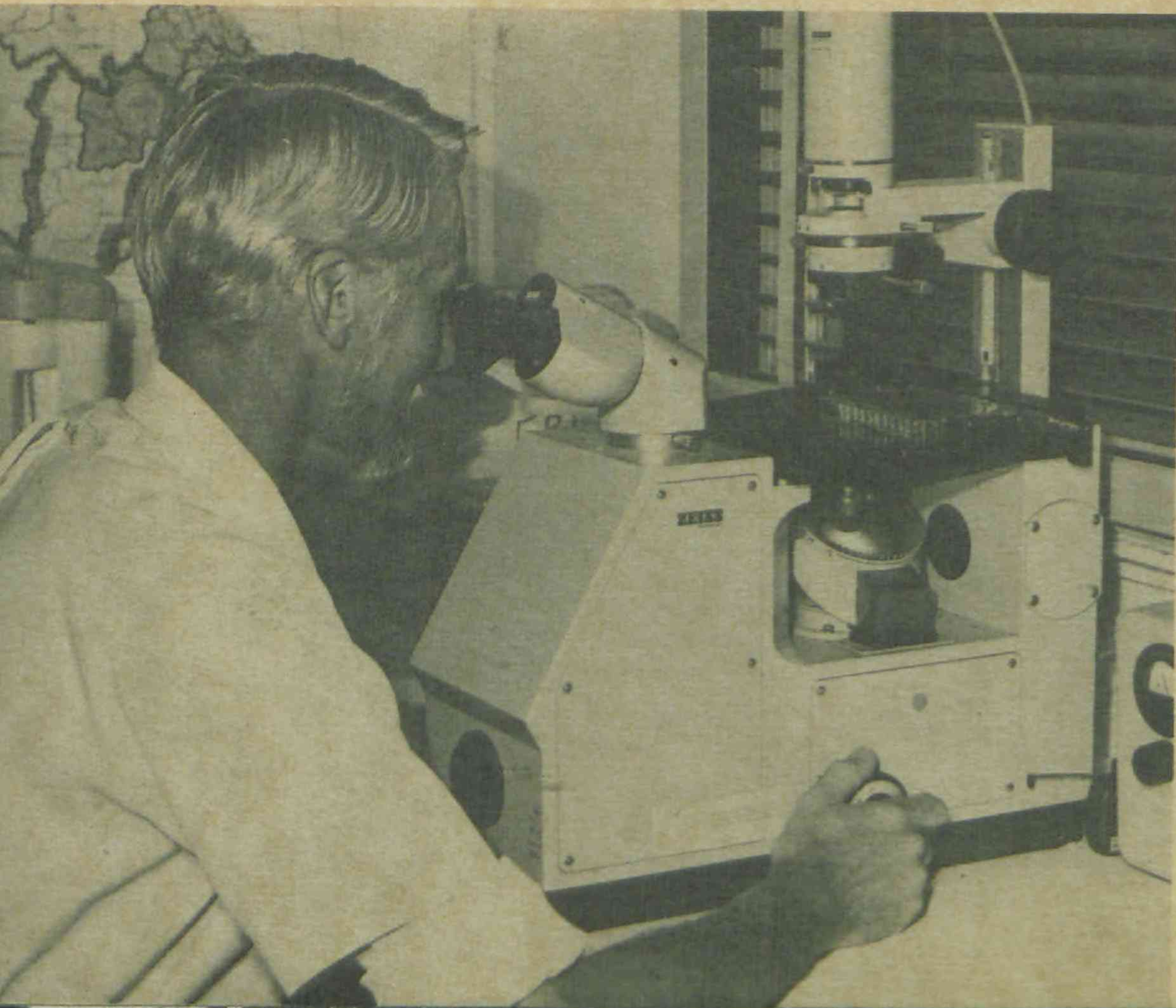
Cashmere production was increased in experiments that used continuous light to enhance linear fibre growth and elicit more than one growth cycle a year. Practical methods of applying these results were being studied.

Pig-feeding experiments to determine the effect of weed seed contaminants in cereal grains were begun. Buckwheat, thornapple, turnip weed and wild cotton were the first of several species to be examined.

Research in the egg industry was directed to improving efficiency of production. Particular attention was paid to the nutrition of the bird, genetic selection of more efficient lines and regional demonstrations of feeding practices.

In the chicken meat industry, investigations concentrated on the

Virus cultures are being examined by microscope at the DPI's Animal Research Institute at Yeerongpilly, Brisbane. Enzootic bovine leucosis virus is being cultured to provide material for serological tests in the dairy herd accreditation scheme.



relationships between management practices and behaviour of the chicken. **Progress** was made in developing a killed vaccine against infectious coryza in poultry. Of six experimental vaccines tested, one containing killed *Haemophilus gallinarum* (serotype C) mixed with aluminium hydroxide as an adjuvant gave promising results in laboratory tests. This vaccine was nearing commercial production.

Brands

Computerisation of brands through the COBRA project progressed significantly. Nearly all records since 1872 had been entered. Additionally, 75% of all currently registered cattle earmark codes and districts and symbol brand descriptions, and details of 60% of all current registered owners were held on computer. Current owners and brand registrations in 15 out of 37 sheep districts had been entered. The COBRA system continued to be displayed to producers, in 1983-84 at the WESTEC Field Day, Barcaldine, and at the Miles Show.

Quarantine

Amendments to Commonwealth quarantine legislation put additional controls on the import of ornamental fish to ensure that only healthy fish are imported and that animal and plant life and pathogenic organisms are absent from the accompanying water. The quarantine provisions prescribing a period of 14 days within registered private quarantine premises operated from 1 March 1984.

The quarantine station at Lytton was to close on 30 June 1984, necessitating the quarantine of cats and dogs from the South Pacific area at Wallgrove Quarantine Station near Sydney.

Exports of cattle to Asian markets continued throughout the year; but, as the year closed, this trade had an uncertain future.

Registration of beekeepers

The DPI developed a microcomputer-based storage and retrieval system for the registration of beekeepers under the *Apiaries Act* 1982. This will streamline the registration process and provide an up-to-date information service.

Tenderness is a major indicator of meat quality. Butchers, processors and producers were unable to detect a difference in tenderness between breeds of cattle at a Beef-Fest seminar. This agreed with scientific findings. The tasting samples were from Herefords, and from Simmentals, Africanders and Brahmans, each crossed with Herefords. The cattle were bred at the DPI's Brigalow Research Station and finished in a Dalby feedlot. The seminar was held at the CSIRO Meat Research Laboratories at Cannon Hill, Brisbane, in November and was organised by the CSIRO and the DPI.

Tasting the samples are (from left): Richard Wilson, Banana Station; Brian Oxenham, DPI Assistant Director-General (Research); Dougal Cameron and Bill Bridgeford, of Stockyard Beef.



Dairy industry highlights

The Queensland dairy industry

Milk production increased by 13.2% to 626m L for the year ended 30 April, despite registered dairy farms dropping in number from 2 712 to 2 655. Australian milk production increased to an estimated 400m L at a time when the world export market was oversupplied. This resulted in reduced prices being paid for manufacture milk in Queensland. The average net price to producers for all milk produced in Queensland declined from 23.1c/L in 1982-83 to 22c/L in 1983-84. **Stage V** of the Milk Entitlements Scheme was due to begin on 1 July 1984. This evoked considerable interest and activity in the south-east Queensland dairy industry, and several submissions were examined.

Dairy farm production

The second Dairy Management in the 80s Seminar was held at Gympie in September and was the year's major extension activity. The theme was 'Focus on Feeding'. More than 700 registrations were received, including 485 dairy farmers and their families from all dairying districts in the State. In addition, 77 firms provided trade displays. The DPI and the Queensland Dairymen's Organisation were joint sponsors.

The demand by dairy farmers for the DPI herringbone pit moulds continued. In 1982-83, farmers built 46 dairy sheds using these moulds; in 1983-84, 41 farmers used them.

A new competition called the Dairy Farm Management Competition was developed and judged, in conjunction with the RNA, for the first time in 1983. The whole farm approach to management was assessed.

The first study of animal response to different rye grass cultivars was taking place at the DPI's Mutdapilly Research Station. At Mutdapilly, methods were being developed to predict maize silage yields, as part of a research programme to develop better dryland farming systems incorporating maize silage.

On-farm trials were being conducted on the Darling Downs and in the South Burnett to determine the suitability of species of maize and sorghum for ensiling.

A DPI book *Silage Management in Queensland* went on sale in 1984. More farmers were seeking advice on supplementary feeding in conjunction with various pasture systems.

Industry-supported work was being undertaken in south-east Queensland, in central Queensland and on the Atherton Tableland to evaluate in commercial

situations N fertiliser strategies to overcome the autumn milk-supply trough. Permanent kikuyu and clover pastures, using newer varieties of clover, were being evaluated as an alternative to the annual high N rye grass pastures.

A 3-month dairy husbandry/technology course was organised and conducted by DPI dairying officers for 18 participants from the Philippines. The Australian Development Assistance Bureau sponsored the course.

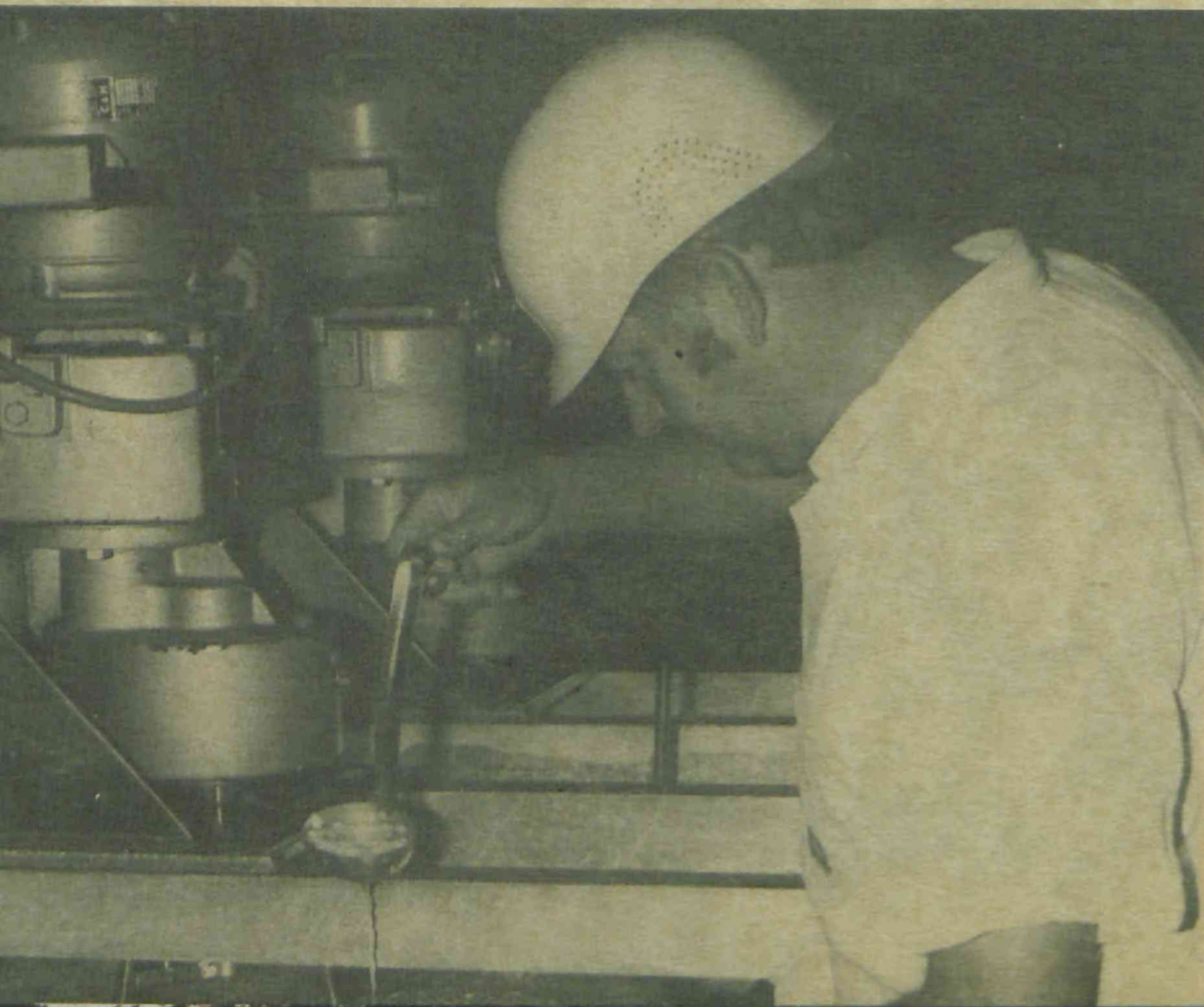
Artificial breeding

Embryo transfer is an established technique in the DPI's bull-procurement procedure. DPI staff collected 159 embryos from 23 cows, resulting in 77 pregnancies. Pregnancies per donor treated were 3.3—a very successful record.

The State had 37 premises registered to sell semen, giving stock owners immediate access to the best genetic material in the world.

DPI dairy researchers at the Otto Madsen Dairy Research Laboratory at Hamilton, Brisbane, are in their ninth year of work to accelerate the development of mature flavour in cheddar cheese.

Cheddar cheese normally has to be matured in coldrooms for between 9 months and 2 years. This adds to the cost of production. The dairy industry has traditionally kept cheddar storage rooms at low temperatures. However, some dairy factories have adopted DPI research results that show the temperature can be raised to shorten the cheddar maturity period without the development of off-flavours. Other DPI trials have used different strains of bacteria to shorten the time needed for cheddar cheese to mature. DPI researchers are also using naturally occurring enzymes in experiments to accelerate the development of mature flavour in cheddar cheese.



Bovine semen exports totalled 43 126 doses, with New Zealand the major market. Most of the bovine semen exported was from the Sahiwal breed (31 794 doses), with the remainder from Poll Hereford (7 840 doses), Hereford, AFS, AMZ, Brahman, Droughtmaster and Holstein-Friesian.

Refresher courses involving technical updating and advice to inseminators were conducted in conjunction with the DPI Wacol AI Centre's promotional activities. On 33 refresher courses, Wacol specialist officers trained 490 people.

Insemination training had another record year, with 351 farmers in 37 'on farm' courses receiving instruction in the 'do-it-yourself' insemination technique. Four courses for beef producers and two for goat breeders were included.

Retailing of herd improvement equipment was a major and expanding part of the Wacol AI Centre's operation. A complete range of artificial breeding requirements and production recording meters was available.

Bovine semen was in steady demand. The Wacol AI Centre and its agents distributed more than 171 000 doses on the local market; 72% was from dairy breed sires, the Holstein-Friesian breed accounting for 69% of all dairy semen distributed.

The Australian Breeding Values second listing, released by the Australian Dairy Herd Improvement Scheme, showed that the Holstein-Friesian sire 'Barron Vale Starlite' maintained his position as one of Australia's leading sires. In the Illawarra breed, last year's top-ranked Wacol sire 'Warroolaba Magnet' was joined in the top five nationally by two other Wacol bulls, 'Sunny View Princess Tenor' and 'Tabbagong Redpath'.

Herd management information services

A total of 987 farmers registered for herd recording—a 13.3% increase over the previous year's total; 40% of Queensland dairy farmers were using herd recording and management services compared with 16% 5 years ago.

Farmers were becoming even more aware of the benefits of using the mastitis cell-count service, with a 22.7% increase recorded in samples tested; 70% of farmers who were herd recording were using the cell-counting service.

The farmer own sampling scheme (FOS) was being used more, with 22% of herd-recording farmers using this option to contain increasing on-farm costs. A trend to the FOS scheme was particularly noticeable in the Wide Bay and Darling Downs regions.

Two new services were introduced to help dairy herd reproductive performance and disease control. The herd management scheme is designed to help the farmer track the reproductive performance and mastitis status of his cows. The complementary dairy practitioners' information service (DPIS) enables the farmer's veterinarian to provide an intensive herd health programme. These services give farmers and their consultants the information they need, in the most suitable form, for operational decisions.

Installation of the VAX computer at the DPI's Dairy Herd Improvement Laboratory, Wacol, enabled herd improvement services to be expanded and gave greater flexibility in meeting the demand for management information services.

Dairy breed improvement

Two Australian Friesian Sahiwal (AFS) bulls were declared AI proven sires during the year. These bulls, S3853 and S2619, brought to four the number of AFS proven sires. All four bulls were being used to breed young bulls for further progeny testing, thus ensuring progressive improvement in milk and fat production. With the initial phase of crossbreeding and securing of first cross heifers completed, a rapid improvement in this new breed's productivity was expected.

A record number of cows—some 18 000 in 300 Queensland herds—were mated to the

The technique of embryo transfer is now widely used in artificial breeding. These young bulls, bred by this technique, will be used in the DPI's future bull proving teams.



Queensland Primary Industries

1
These ponds, which were completed in 1983-84, will hold Nile Perch that are to be imported from Africa in early 1985. The ponds are part of the exotic fish quarantine complex at the DPI's Walkamin Research Station on the Atherton Tableland. The complex includes a laboratory in which part of the imported stock will be held while the remainder are tested for diseases at the National Fish Health Reference Laboratory at Benalla, Victoria. The fish will only be released to the Walkamin ponds if they are free of dangerous diseases. Nile Perch, which breed in fresh water, have been proposed for introduction to Queensland's lakes and reservoirs to provide a high-quality sporting fish.

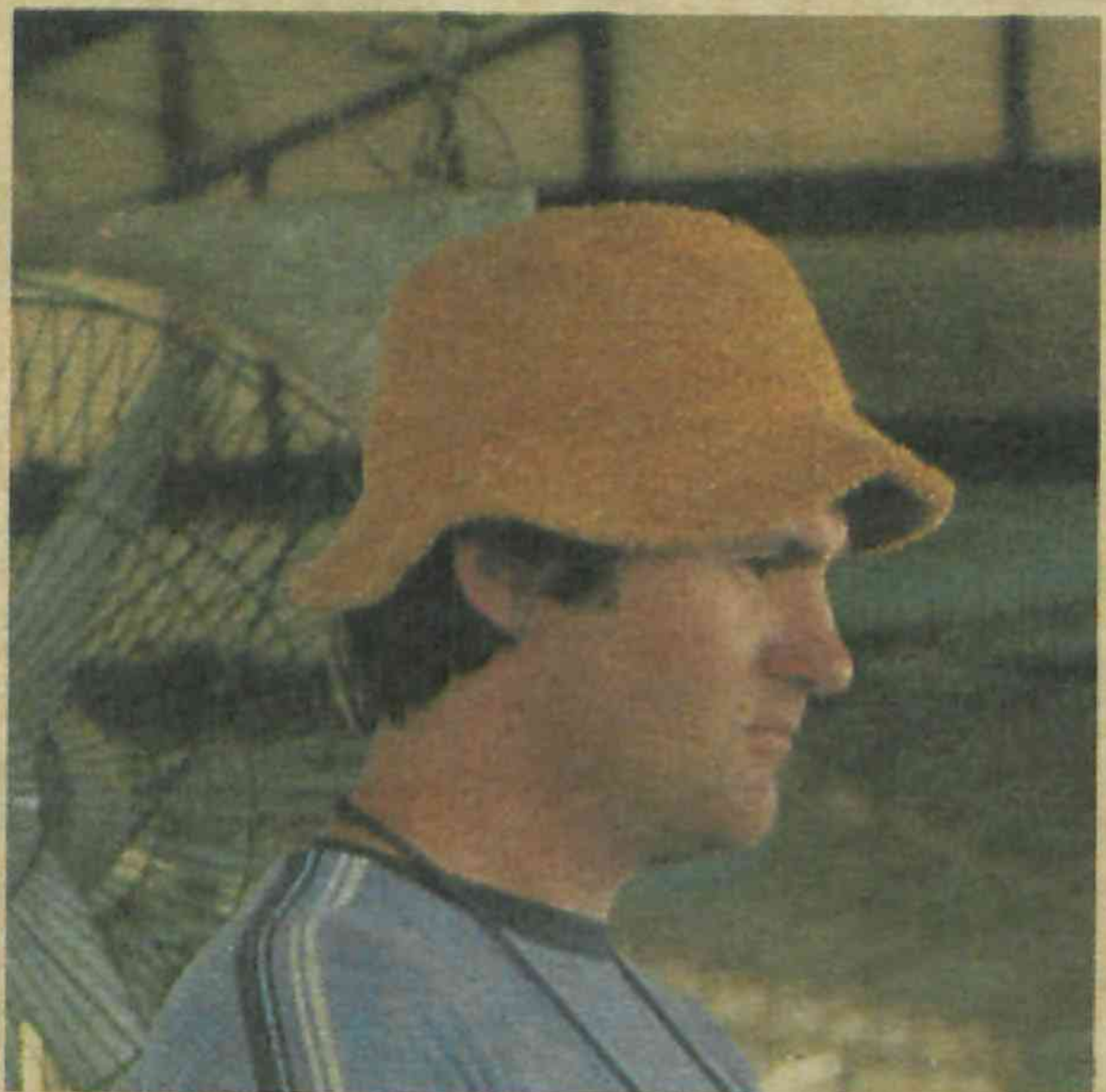
2
A DPI biologist samples spanner crabs near Moreton Island as part of a programme to establish management controls for this new fishery.

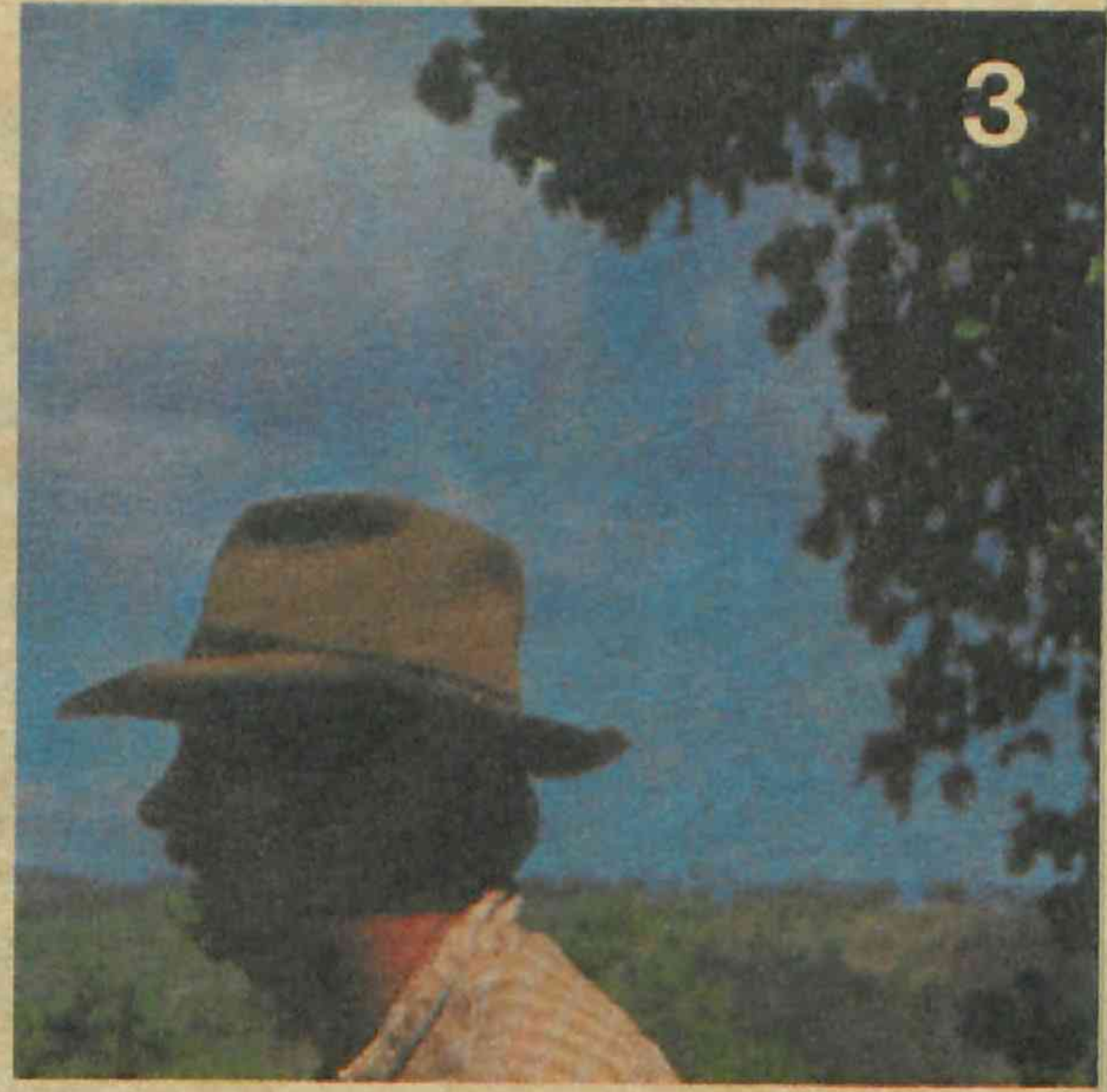
3
Beef cattle husbandry officers weigh out rice straw and lucerne hay. This is part of a DPI research project to determine if the feeding of different roughages prevents carcass weight losses in cattle resting before slaughter.

4
DPI scientists use a Rainulator to simulate rainfall on plots that have different tillage treatments. The flume (foreground) measures runoff volumes and allows water samples to be taken to determine soil loss.

5
A DPI husbandry officer observes the feeding behaviour of meat chickens in a commercial chickenshed at Redland Bay near Brisbane. Feed consumption and conversion are the most important criteria for profitable chicken-meat production. Information on bird behaviour helps producers select feed equipment and feed-management programmes that match the birds' needs and optimise performance.

6
The DPI's continued research effort in plant breeding and pest control helps improve yields of grain crops. This even crop of grain sorghum was grown on the Darling Downs.





1983 Holstein-Friesian team of 14 bulls, while 20 000 cow nominations were expected for the 20-member 1984 team. Since 1979, cow nominations have increased sixfold and numbers of test sires threefold. The number of co-operating farmers has more than doubled.

Illawarra proving continued, and the number of cows involved in the scheme increased. In conjunction with New South Wales, a team of eight bulls began testing. Unfortunately, because of a lack of cow nominations, Jersey progeny testing was discontinued.

Dairy goat husbandry

Practices to minimise the seasonality of goat milk supply were being investigated. Inducing does to mate and kid out of season, so that they are in peak lactation during the deficit period, appeared most promising. It involves pregnancy testing and inducing oestrus. A pregnancy test kit (using milk samples) for farmers should be developed soon.

A good market was developed for the export of Queensland milch goats to South-East Asian countries. In one order, 100 Saanen goats were shipped to Thailand.

The Australian Centre for International Agricultural Research's workshop on goat husbandry research requirements attracted an international audience. DPI officers were preparing proposals for collaborative research with institutions in developing countries.

Dairy factory activities

The Queensland dairy processing industry continued to invest in new or renovated buildings and new equipment. Expenditure on buildings was \$3m and on equipment, \$1.4m.

Courses for candidates undertaking study for certificates of competency in dairy manufactures were restructured in conjunction with the Technical Correspondence School, to update technical information and to simplify assessment procedures. More than 100 candidates passed theory and practical examinations during the year.

About 30 dairy industry personnel attended one-week training schools on dairy produce laboratory techniques and manufacture of milk products.

The quality of pasteurised milk and milk products continued to be very good. The hygienic quality of raw milk throughout the State improved markedly.

Developments in dairy research

Collaborative research between a local dairy company and the DPI resulted in a process for producing a soft cheese using ultrafiltration equipment. The company was preparing to produce this cheese commercially, using the new process.

Cheddar cheese normally requires up to 12 months' refrigerated storage to develop desired flavour levels. As a result of many trials, recommendations were made to help commercial cheese factories reduce this ripening time by manipulating time-temperature combinations of storage.

The trend towards centralised and automated testing and reporting of milk and dairy product programmes continued with the closure of the Toowoomba Dairy Research Laboratory, the inclusion of results from all laboratories in the computerised reporting scheme and the addition of more automated equipment for bacteriological analysis.

A survey of farm research needs at the Dairy Management in the 80s Seminar in September gave mastitis top priority, thus emphasising the importance of the DPI's mastitis research programmes. DPI officers modified a pH spot test for mastitis and helped a Queensland veterinary products firm to develop the method commercially as a quick, cheap test for identifying cows with mastitis. Economic losses from the effects of mastitis on milk processing and cheese and yoghurt manufacture were being investigated.

Low levels of protease activity in raw milk can cause gelation in the UHT milk produced from it. Trials were under way to determine whether a new assay system utilising radioactive carbon (carbon-14) was sensitive enough to detect this activity.

Salmonellae were detected on three occasions from skim milk powder manufactured at one of the three Queensland factories producing powder.

Clearance testing of associated batches and environmental samples involved much labour and materials, with 207 NATA certificates being issued for 11 160 samples.

The work of the DPI's Dairy Research Branch was expanded to encompass post-slaughter meat research, with the DPI's Animal Research Institute continuing its pre-slaughter work.

Plant industry highlights

Agriculture

DPI field and forage crop and pasture improvement programmes continued to supply the State's primary industries with superior cultivars.

The midge-resistant sorghum female line QL 29 was one of seven lines, with varying midge resistance, to be released. It extended the potential for resistant hybrids, since most current resistant lines are males.

Two sweet potato cultivars LO-323 and NC3 were popular. Cultivars are supplied virus free to growers. Yields from virus-free plants are up to twice those from virus-infected plants.

Two new annual pasture legumes,

Glenn jointvetch and Wynn cassia, were released, in conjunction with the CSIRO. Glenn jointvetch is suited to poorer soils of the central coast. It tolerates waterlogging and can withstand heavy grazing. Wynn cassia is suited to light soils receiving more than 500 mm of annual rainfall. It tolerates heavy grazing better than siratro and appears disease free.

Pasture seed production research has led to the establishment of a \$0.5m industry producing Callide and Samford Rhodes grass seed in the coastal areas south of Bundaberg. The DPI has earned an international reputation in tropical pasture- and fodder-seed production. A total of 16 trainees from 10 overseas countries participated in a DPI-organised seed-production course.

New soil tests for predicting the phosphorus and potassium requirements of soybeans were shown to be good predictors of optimum fertiliser application rates. The tests were being evaluated on other crops and had given promising results with potatoes.

Extension programmes have resulted in widespread farmer adoption of crop, fallow and rotation management practices that conserve soil and reduce erosion, particularly in grain-growing districts. Zero tillage, herbicide substitution for tillage and stubble mulching were being practised on an increasing number of grain farms.

Early March-planted wheat had become widely adopted in the Central Highlands and Dawson Callide to produce more reliable yields and to provide adequate levels of crop stubbles for soil protection during the subsequent summer.

The cotton industry consolidated previous gains and produced a record crop exceeding 5 bales/ha. Research and extension officers contributed significantly to this advance in the areas of crop establishment, crop nutrition, irrigation management and pest control.

Cereal chemistry

Cereal quality research was directed at assessing quality within the DPI's wheat-, barley- and rice-breeding programmes and development of new grain-quality evaluation methods.

Excessive dough stickiness was found in some unreleased wheat cultivars derived from rye. Because this material offers improved disease resistance and agronomic properties, its dough properties were being further studied.

Screening of wheat for resistance to weather damage was increased, and research was begun on ways to avoid or reduce damage caused by sprouting of grain after rain.

A programme to develop improved tropically-adapted rice varieties for the north Queensland industry meant that many breeding lines would need to be screened for grain-quality. Laboratory procedures were developed to analyse amylose, which is considered the single

This well-grown cotton crop on the Darling Downs was typical of the 1983-84 season.



most important determinant of rice grain quality.

Horticulture

Tomato-improvement programmes emphasised fruit yield and quality, disease resistance and production systems. Release of a variety resistant to Fusarium wilt (Race 3) was imminent for the Bowen district; more broadly-based resistances were being derived from interspecific and intergeneric crosses with *Lycopersicon pimpinellifolium* and *Solanum penelli*.

Fresh market tomato variety Delta Contender produced larger fruit and higher yields than Flora-Dade during the main winter-production season at Bowen and was performing well in the Lockyer Valley and Bundaberg areas. Delta Contender also has better eating quality and longer shelflife.

Tomato production systems incorporating raised beds, plastic mulches, seedling transplants and trickle irrigation were being widely adopted and machinery had been developed to perform all operations. The systems were also being applied to melons and vegetables. The high capital costs are offset by higher yields of marketable fruit, better pest and disease control, and more convenient management.

Processing pea plantings were expanding at the expense of production areas in southern States. The expansion was helped by varietal selection that provided a suite of very early, early, mid and late season varieties superior to previous varieties such as Polaris and Small Sieve Freezer (which have been largely replaced by Spring, Pania, Patea and Princess).

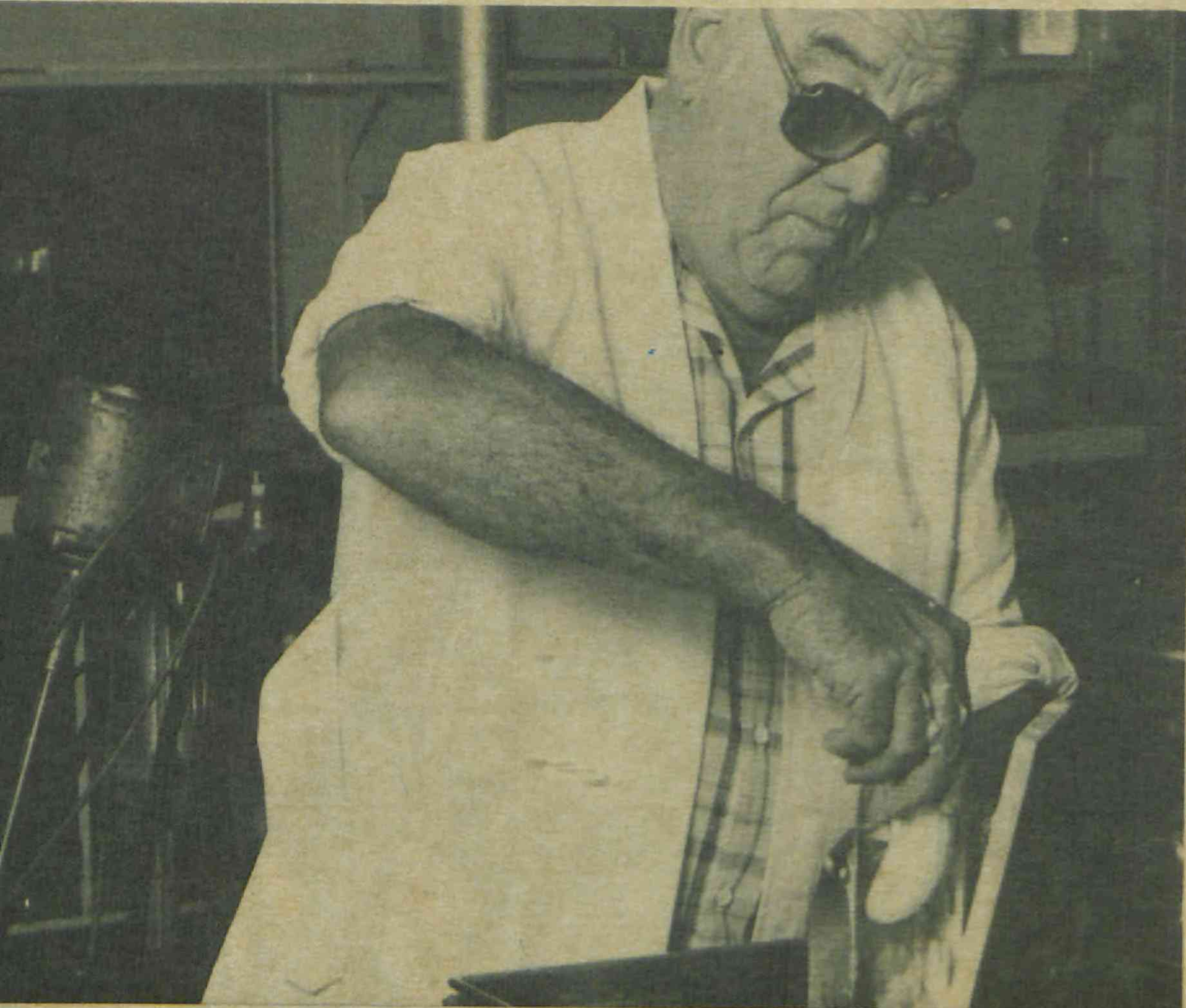
The Shepherd variety of avocado, identified from 8 years of evaluation on the Atherton Tableland, matures 3 to 4 weeks earlier (mid-February) than Fuerte and Rincon. Planting material was in considerable demand. Fourteen Queensland avocado nurseries were accredited as being free of *Phytophthora* root rot.

The stonefruit collection was extended to 258 varieties, with 67 new overseas and interstate introductions. Orion peach, with similar chilling requirement and maturity to Springold, has superior fruit quality. Flavortop, a mid-season nectarine, has highly coloured fruit of excellent appearance. Fairtime, a large fruited dessert peach, extends the available maturity range by one week to the end of February.

Post-harvest technology. DPI demonstration and training programmes led farmers to convert 50 tomato-ripening rooms into trickle ethylene systems at Bowen. DPI promotion resulted in many farmers adopting pre-transport cooling on their farms. A number of new cartons had been developed and were being used by industry. They include a single-layer tray pack for mangoes and avocados, an 18 L grape carton, a 28 L banana carton and a stonefruit traypack.

Extension services in pesticide application technology were increased. Trained personnel were helping growers to operate all types of hydraulic, air-blast and ultra low-volume equipment. Most work was done with growers of citrus, avocados and beans.

A DPI food technologist prepares bananas for juice production at the DPI's Sandy Trout Food Preservation Research Laboratory at Hamilton, Brisbane; research has led to a possible outlet for sound fruit with skin blemishes.



Entomology

The banning of the fumigant ethylene dibromide (EDB) by the United States was serious for the Australian fruit trade, which requires disinfestation treatments for pests such as Queensland fruit fly. The development of alternative treatments became a priority. In the longer term, ionising irradiation might be used. The feasibility of this method was being studied. In the shorter term, physical treatments such as low temperature might be used for those fruits that tolerate the method. Tropical fruits generally have a poor tolerance to cold; however, dip and spray treatments using dimethoate or fenthion have potential for use on fruit for export. These treatments were originally developed to meet Victorian market conditions.

Recapture experiments in northern Victoria, in collaboration with the Victorian

Department of Agriculture, investigated dispersal of the Queensland fruit fly. The flies were sterilised to prevent the establishment of a colonising infestation. The purpose of the dispersal studies is to determine if fruit fly populations in Victoria are derived from resident overwintering flies. The results could have important implications for Queensland fruit growers.

Adult fruit flies feed on leaf and fruit-surface bacteria. Research continued on isolating the specific bacterial food of different fruit-fly species. When this is completed, it will be possible to use these bacteria in new specific bait-spray formulations to control pest fruit flies in orchards. In field-attractancy tests, bacteria isolated from the stomachs of field-collected fruit flies attracted up to 20 times more flies than autolysed brewer's yeast, which is the attractant component of bait sprays currently available.

Watermelon mosaic virus, which is transmitted by aphids, is a serious disease of cucurbit crops in coastal Queensland, causing deformed fruit and loss of production. Silver-sided reflective mulches effectively reduce the incidence and spread of the virus. Yield of a mulched rockmelon crop was almost double that of an unmulched crop. The reflective mulch deters the aphids from landing and feeding, and thereby infecting the plants with virus.

Insecticide screening trials at Mareeba led to use of the insecticide carbofuran for control of the white rice stem borer. This resulted in the district average yield from the summer rice crop increasing by 1 t/ha. In previous seasons, late-planted crops suffered up to 40% damage. The use of carbofuran has also allowed Mareeba rice growers to plant later and avoid harvesting problems associated with wet weather.

A sorghum pest management package, comprising a suite of computer programs called SORPEST, was developed. The package allows a grower to enter pest infestation and crop development information into a computer and to obtain advice on the expected loss of income and control action required.

DPI entomologists continued to investigate the relationship between numbers of female sorghum midge visiting sorghum heads in flower and resulting grain yield loss. Results indicated that midge-susceptible hybrids lose five times more weight of grain per visiting midge than the most resistant hybrids from the DPI's breeding programme. Resistant hybrids sprayed with insecticides yielded about 6 t/ha whereas susceptible hybrids produced 3.7 t/ha. The same hybrids unsprayed produced 4.8 t/ha and 1.3 t/ha respectively.

Use of 'Beetle Bait' to control soil-inhabiting insect pests resulted in increased plant populations and more even stands of sunflower crops in the Central Highlands. The bait comprises crushed wheat or sorghum grain, sunflower oil and the insecticide chlorpyrifos. Baiting of infested areas reduces the populations of false wireworm beetles, field crickets and wingless cockroaches, which can inflict serious damage on sunflower seedlings. Farmers distributed baits over about 40 000 ha of the Central Highlands.

The retail florist trade in Queensland imports large quantities of flowers and ornamental leaves from New Zealand and Asia. About 12% of flowers arriving from New Zealand during January-February were infested, mainly with thrips.

Whenever the Plant Quarantine Service discovered infestations of exotic insects in imported flowers, the blooms were treated immediately to eliminate the infestations and prevent establishment of the pests in Australia.

Grain-protectant insecticides, for use on maize and rice during storage, were being studied in a project supported by ACIAR (Australian Centre for International Agricultural Research). Collaborative research on the project in South-East Asian countries involves agreements with the National Post Harvest Institute for Research and Extension in the Philippines; negotiations were proceeding with the Malaysian Agricultural Research and Development Institute.

A DPI district experimentalist inspects a sunflower variety in the South Burnett.



Plant pathology

A new race of sorghum head smut (Race 3) was found in a male parent line TAM 422 in a sorghum-crossing plot at Mt Tyson in November 1983. Tests began to determine whether any commonly grown hybrids are resistant. The race had not been found elsewhere in the State and a subsequent planting of sorghum cultivars at Mt Tyson was not affected.

Zucchini yellow mosaic virus was recorded for the first time in Queensland on pumpkins in the Lockyer Valley. This virus is related to watermelon mosaic virus, but causes more severe symptoms. However, breeding lines resistant to watermelon mosaic virus also appear to be resistant to zucchini yellow mosaic virus. Commercial cultivars resistant to these two serious virus diseases were expected within 2 or 3 years.

Boil smut continued to spread throughout south-east Queensland, being reported as far north as Cloyna near Murgon and as far west as the Dalby-Cecil Plains Road. Generally, relatively few plants in any one crop were affected. Laboratory tests indicated that the fungicide Bawsan[R] kills spores contaminating maize seed, without adverse effects on germination after 12 months' storage.

Poor growth of rice in the Ayr district was shown to be caused by needle nematodes feeding on the outside of roots. The nematode does not attack rice until it is flooded, a finding that may help in the search for practical control measures.

Stripe rust was detected in commercial wheat crops in Queensland for the first time in July 1983 in the Toobeah-Goondiwindi area and later throughout the Darling Downs. Between 10 000 and 15 000 ha of wheat was sprayed with bayleton or propiconazole in an attempt to control the disease.

Soil solarisation using plastic to heat soils and destroy soil pathogens was being tested at Redland Bay and Bowen. Encouraging results had been obtained in the control of verticillium wilt of tomatoes.

Anthracnose, a fungal disease that reduces productivity and seeding of stylo pastures, continued to hinder development of improved pastures in the wetter coastal areas. The development of resistant stylo cultivars was set back when more races of this highly complex pathogen appeared.

A pesticide application manual went on sale during the year. Its aim is to increase awareness of the principles and practices involved in all forms of pesticide application for plant protection. More than 200 DPI and Bureau of Sugar Experiment Stations extension and advisory officers have done an intensive course on pesticide application.

Sunflower breeding lines with resistance to races 1 and 3 of sunflower rust were released for use by public and private plant breeders. This material was derived from crosses between oilseed sunflower (*Helianthus annuus*) and wild sunflower (*H. argophyllus*).

Phytophthora root rot of avocado was controlled by phosphorous acid as effectively as control by foestyl (Aliette [R]) and metalaxyl (Ridomil [R]). Trials were examining the effectiveness of phosphorous acid injected into the tree trunk.

Botany

More than 12 000 plant specimens were identified for primary producers, consultants, DPI staff, other State and Commonwealth departments, and the general public. Advice on poisonous properties, weed potential and control, and distribution were supplied for most of these.

The computerised data base of herbarium records contained 377 400 entries, making a vast amount of information readily accessible. The herbarium collection expanded by 14 900 specimens and all New Guinea material was incorporated. Some 14 500 specimens were exchanged or lent to other institutions.

The first of three volumes of the *Flora of South-eastern Queensland* was published. This is the first substantial work on the

A home-made boom spray applies fungicide to peanuts to control leafspot and rust on a property near Tolga.



flora of the State in 80 years. Major contributions were made to the *Flora of Australia*, which is a Commonwealth project aimed at publication of 50 volumes over the next 20 years.

Certificates of Identification under the *State Health Act* were issued for 2 644 samples of *Cannabis sativa* submitted by State Police Officers. This was an increase of 23% over 1982-83 identifications.

Biometrical support

DPI biometricians used microcomputers to simulate small or partial systems in a series of models to manage post-harvest produce. Those developed included banana green life during transport, bruising in apples during handling, colour development in tomatoes, post-harvest water loss in horticultural produce, shelflife under varying environmental conditions, and development of pathogen damage and ripening in avocados. Each of these models is readily available to horticultural producers and processors.

Plant breeding involves screening hundreds of varieties and crosses for many years over a range of sites. Improvement in design and analysis of these experiments leads to greater accuracy in selecting superior varieties, allows a wider range of material to be screened and uses research facilities more efficiently. DPI biometricians were implementing the latest developments in control of micro-environmental effects using grid-plot designs and neighbourhood corrections. They were then doing a simulation study to compare nearest neighbour techniques with standard procedures over a range of typical patterns of field variation. Computer programs, written by DPI biometricians, produce field layouts for experiments, and analyse and summarise data. The DPI's State-wide network of SR72 microcomputers facilitates the data processing.

The DPI is researching ways of controlling insect and disease damage to avocados. Here DPI scientists examine lesions on an avocado.



Land management highlights

New branch

Soil degradation from water erosion and salinity is the major constraint on the long-term sustained productivity of Queensland's agricultural and grazing lands. In 1983-84, in accord with a heightened national awareness to conserve 'the soil', the DPI consolidated its soil conservation research into one branch, the Soil Conservation Research Branch. Its charter is to define land degradation processes, and to develop and extend practical management systems and techniques for continued land productivity and stability.

Erosion incidence

The wet winter compounded erosion problems caused by the 1983 drought-breaking rains. Prolonged runoff caused serious gully erosion in many previously stable waterways and drainage lines on the Darling Downs, and in the South Burnett and Moreton regions. Where trees had been removed from hillsides in the Bremer and Lockyer catchments, many landslips occurred.

Below-average to average summer rainfall, combined with high stubble residue from the large wheat crop, kept erosion levels low in most of the extensive cropping lands. Isolated storms caused more serious localised damage. Normal summer rainfall on the wet tropical coast produced soil losses of 100 to 150 t/ha.

Adoption of soil conservation measures

Soil conservation officers designed and surveyed soil conservation measures (contour banks, waterways and strip cropping layouts) on 64 000 ha of cropping land. The implementation rate was lower than in the previous 2 years, particularly in the extensive cropping lands.

Lower liquidity after the drought reduced many farmers' ability to finance works, and the wet winter and spring delayed construction activities. These same economic and climatic conditions markedly increased conservation tillage practices in the grain and cane industries.

The wet winter made the mechanical control of weeds and summer crop regrowth in the grain-growing areas difficult, and herbicides were widely used. The successful results generally obtained were expected to entice many farmers to adopt chemical weed-control practices.

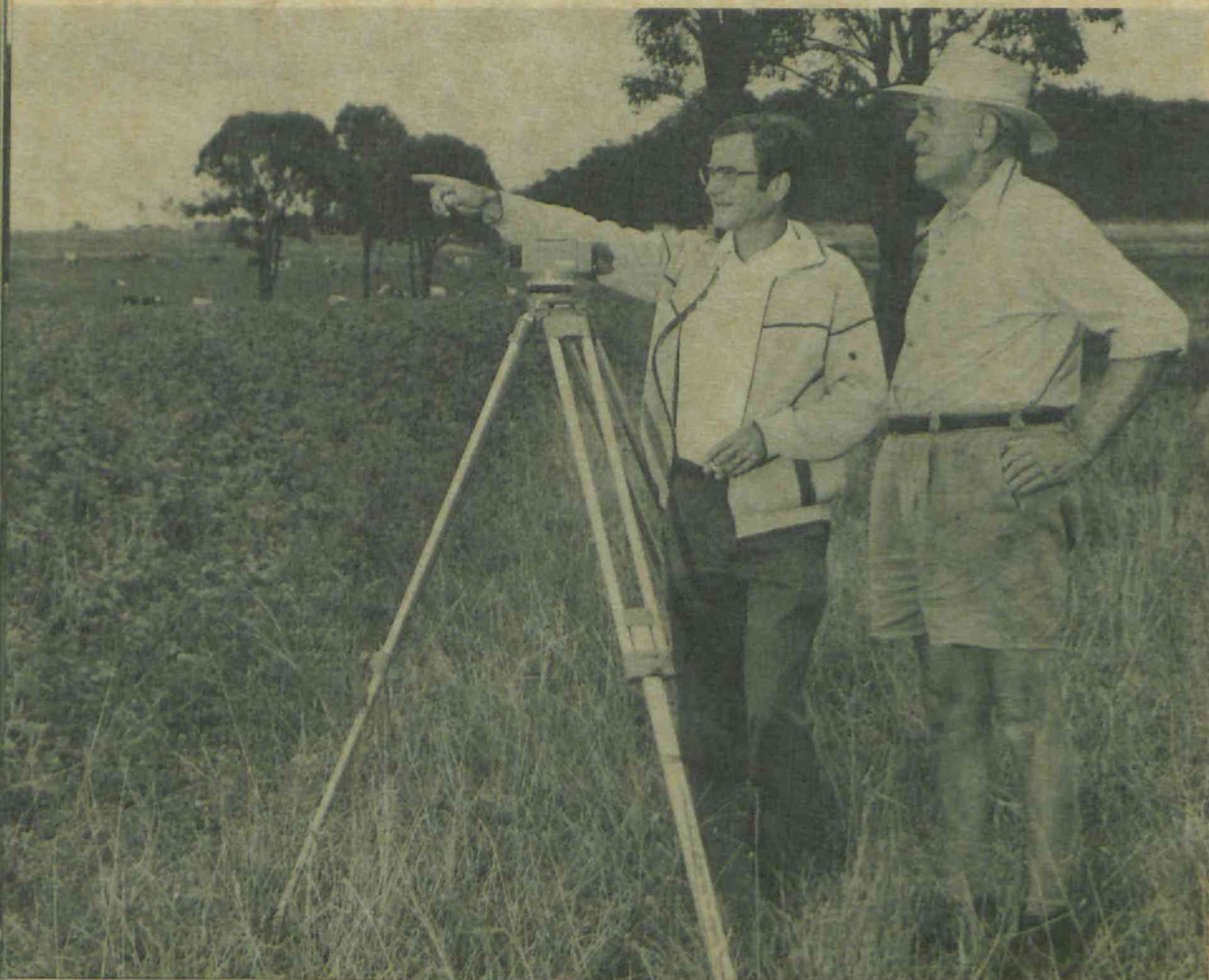
The continuing low world sugar prices encouraged many cane farmers into cost-saving minimum tillage practices. For example, about 15% of cane farmers in the Mackay district had experimented with trash retention, reduced tillage or chemical weed-control practices, and some 5% were practising minimum tillage on much of their farms.

Landholder and community involvement

The massive erosion caused by the drought-breaking rain aroused community interest in soil conservation. However, because of many landholders' poor financial circumstances after the drought, requests for specific advice were at similar levels to those of recent years.

Wet weather delayed the surveying and implementing of works, and resulted in a 33 $\frac{1}{3}$ % increase in the number of

A soil conservation officer discusses the location of erosion control works with a Darling Downs farmer.



landholders awaiting soil conservation service. Even so, 457 landholders implemented their first surveyed soil-conservation measures, bringing the total number of cooperators to 11 823, or 50% of those affected by soil erosion.

Extension

A conservation cropping extension package of two video programmes, a pamphlet and an *Extension Officers Guide* was prepared in a joint University of Queensland—DPI extension research project. Surveys had identified the need for such a package to support extension officers' activities in promoting conservation cropping systems in Queensland.

Three seminars entitled 'Protecting the Sloping Brigalow Lands' were held at Chinchilla, Wandoan and Dulacca. Speakers provided guidelines on developing brigalow country for cropping. An average of 50 landholders attended each seminar.

Enhanced services

The soil conservation programme in the extensive cropping lands was enhanced with a \$58 000 allocation from the National Soil Conservation Programme, for staff and equipment for three group schemes in central Queensland.

A grant under the Community Employment Programme allowed the employment of surveying and drafting assistants to supplement DPI soil conservation services in grain- and cane-growing areas.

Land resource assessment

Sugar industry land-use studies progressed satisfactorily. Digitising of maps prepared for the wet tropical coast overview study revealed that there are about 100 000 ha of potentially arable land on private holdings and 15 000 ha in State forest reserves. These areas are additional to the 125 000 ha currently utilised for sugar-cane and the 3 000 ha for horticulture.

Final drafts of the reports on 'Land Resources' and 'Land Suitability' were ready for publication in the *Mackay Sugar-Cane Land Suitability Study*. Maps illustrating 'Current Cane Assignments', 'Land Suitability', 'Land Use and Land Suitability' and 'Soils' had been printed. Field work for the Plane Creek Sugar Cane Land Suitability Study was completed. Some 34 soils were described, and Bureau of Sugar Experiment Stations extension officers in the region were using recommendations on soil and land management practices.

The cooperative soil mapping and land-use study of the Tully-Cardwell region continued. About 30 000 ha of the 115 000 ha total area were mapped and 50 soils identified. In the Herbert River region, about 124 000 ha of the 150 000 ha total area were mapped and 46 soils identified. Land suitability assessments were completed for parts of the Mossman region. A report on the Julatten area was prepared and released, mainly to document potential areas for expansion of sugar-cane growing in this part of the Mossman Mill area. A similar study was completed for the Cape Tribulation area and a report was being prepared.

The high intensity 1:25 000 soil mapping of the Leichhardt Section of about 9 500 ha—the first area to be subdivided for irrigation in the Burdekin Irrigation Area—was completed. The Queensland Water Resources Commission transferred the data to 1:10 000 topographic plans to help farm subdivision and layout of the proposed irrigation scheme. Soil suitability ratings for a range of crops were determined. Land and soil limitations and specific management requirements were identified.

The report on the *Land Resources of the Burnett Region—Part 1: South Burnett* was published. It described and mapped the

A conservation cropping information package was developed by the DPI's Soil Conservation Services Branch and the University of Queensland's Department of Agriculture to assist DPI officers in extension projects.



land resources of about 1.064m ha of the South Burnett Region and outlined broad management requirements for each mapping unit. Work continued on defining land resources of the Central and Northern Burnett Regions.

The Coastal Burnett Region is an area where urban and agricultural expansion could result in land-use conflict. To provide basic land-resource and land-suitability data for sound future development, a major land-resource study was begun covering the coastal area from Gympie to Gladstone. The initial overview study, to be completed by early 1985, will indicate priority areas needing further detailed resource studies.

The Australian Soil and Land Survey Field Handbook was published during the year. The main author is a DPI officer. The book provides one reference set of definitions that are applicable to Australia and specifies methods, standards and terminology for describing soils. In addition, significant contributions were made on specifications for soil survey for the *Australian Soil and Land Survey Methodology Handbook*, which was being prepared.

Development planning and evaluation

The irrigation potential of land resources downstream of the proposed Teviot Brook dam was investigated at the Queensland Water Resources Commission's request. An area of upland Walloons and sections of the alluvia were identified as unsuitable for irrigation because of seepage salting. The report and maps were nearing completion.

The report on the Upper Flinders River irrigation proposal was published. A reconnaissance soil survey of the Hughenden-Prairie region concluded that the massive earths of the Baronta plateau had some potential for irrigated horticultural tree-crop production, while the self-mulching grey clays of the Mitchell grass plains had potential for irrigated grain production. Further detailed studies were required before any irrigation scheme could proceed.

An evaluation of the dryland cropping potential of the Nebo-Collinsville region was requested by the Lands Department to assist the renegotiation of leases and the determination of living-area standards. The preliminary evaluation indicated a substantial potential for dryland cropping as an adjunct to beef-cattle production in the Mackay hinterland.

Identification of lands with potential salinity problems remained a high priority. Based on detailed studies of the occurrence and processes of seepage salting throughout Queensland, generalised techniques for identifying susceptible lands were available for DPI officers to use. Posters summarising these techniques were distributed and a detailed report was to be published in 1984-85. The techniques proved effective in the initial screening of lands not suited to development because of a seepage salinity hazard.

Land management field manuals for five major cropping areas—Goondiwindi, Wandoan, Roma, south-east Darling Downs and coastal Wide Bay-Burnett—were prepared. They provide a suitable soils base for farm planning, specifications for runoff control structures, the limitations and management of the soil resource, and suitable conservation management systems.

Requests from local authorities for help in defining areas of valuable agricultural land continued. Detailed land-suitability plans based on specific land-resource investigations were completed for Atherton, Eacham and Tiara shires. Existing resource data were used to prepare plans for Douglas and Sarina shires. A high demand continued from local authorities for land-suitability assessments of land subjected to rezoning application for subdivision. Considerable progress was made in getting the cooperation of many local authorities to preserve valuable agricultural land through their town planning processes.

After excessive clearing of uplands, severe water-table salting has occurred in some Lockyer Valley catchments.



A special issue of the DPI's *Queensland Agricultural Journal* was prepared to help promote an awareness of the role of trees on farms.

The problems of overclearing were highlighted. Tree plantings help control salinity, lead to the stabilisation of erodible areas, provide shelter and windbreaks, maintain water quality, conserve wildlife, and provide timber for farm use and commercial production.

Land management research

Traditionally, research has focused on water erosion in the grain lands of the eastern Darling Downs. More recently, it has been expanded to similar soils in the Central Highlands. New research initiatives with a wider geographic base were examining erosion rates and processes on brigalow soils used for grain growing in the western Darling Downs, the Maranoa and central Queensland and in sugar-cane lands along the Queensland coast.

Darling Downs. Contour-bay size tillage by stubble-cover experiments, established on a black earth at Greenmount in 1978, quantified the value of stubble cover for minimising soil erosion. The advantage of a stubble-retention system was dramatically illustrated during the prolonged unseasonal rain from April to June 1983. Soil losses of 70t/ha from a bare fallow were reduced to 12 t/ha for a stubble mulch, reducing further to 4 t/ha for the zero-tilled contour bays. Differences in erosion quantities were accompanied by big differences in the quantity of surface runoff. In terms of crop establishment and growth, this water is essentially wasted. Research was focusing on the way stubble cover reduces such waste, thereby increasing both the store of subsoil moisture and the opportunities for small storms to become effective planting rain.

Maranoa. A contour-bay size experiment, similar to the Greenmount study, was established in late 1982 at Wallumbilla, near Roma. The soils and climate of the Maranoa differ from the eastern Darling Downs in two important ways: brigalow grey cracking clays replace the black earths of the eastern Downs, while rainfall is both lower and more variable. The objective of the study is to establish whether the now well-proven stubble retention-minimum tillage systems on the black earths can substantially reduce soil erosion and runoff on the brigalow clays.

The heavy rains of April-June 1983 created runoff depths in excess of 120 mm, irrespective of surface treatment. Associated soil-moisture studies indicated that many of these brigalow soils do not store subsoil moisture below depths of 600 to 900 mm. This result markedly contrasts with subsoil moisture stores to depths of 1500 mm or greater in the black earths. Such findings illustrate the importance of developing tillage strategies for optimum surface and near-surface moisture storages in these grey clays.

Nutrient loss by erosion. Losses of soil nutrients contained in eroded sediment were measured for a range of Darling Downs soils, as part of a programme to study the effect of erosion processes on the type and size of sediment produced. Because such detailed data is extremely difficult to obtain during rainfall events, a large rainfall machine—the Rainulator—was used to simulate natural rainfall. For a sandy loam topsoil, total nitrogen, organic carbon and phosphate levels in the inter-rill sediment were two to three times greater than the levels in the original soil. For rill erosion, sediment size was larger and the degree of nutrient enrichment was far less. These results illustrate that the type of sediment produced can have pronounced effects on soil fertility over and above that expected from considering just the amount (tonnes per hectare) of eroded soil.

Tillage systems. Soil conservation benefits of stubble retention-minimum tillage have been dramatic and clear cut in contour-bay size experiments on the Darling Downs. However, it is important to demonstrate that such tillage systems are practical at a farm scale over a wide range of soils and

A weir equipped with water-level recorders and automatic water samplers is installed at the contour bay of a brigalow grey clay at Wallumbilla, near Roma. The installation allows measurement of runoff volumes and soil losses in the runoff water.



climates in Queensland and that no crop yield penalties will be incurred. To this end, tillage-by-yield trials were conducted on a brigalow clay, near Biloela, over the last 6 years. The results clearly showed that both stubble mulch and zero tillage give grain-sorghum yields that are equal to or better than yields obtained from conventional tillage practice. Associated soil-moisture studies identified increased subsoil moisture under the conservation tillage methods.

To illustrate the value and practicability of conservation tillage in central Queensland, demonstration areas were established on farmers' properties in the Dawson-Callide area. Soil types being studied are duplex profile, a brown non-cracking clay and a grey cracking clay. Crop yield, stubble residue and economic comparisons between conservation and conventional tillage systems were being evaluated for wheat and sorghum fallows.

Sugar-cane lands. Soil losses as high as 380 t/ha/year from some sugar-cane lands in north Queensland illustrated a pressing need for changes to existing farm-tillage practices. In 1982, a cane residue management programme was begun by the DPI and the Bureau of Sugar Experiment Stations on cane lands from Childers to Innisfail. Results were startling, with an almost tenfold reduction in soil loss recorded at Innisfail when zero tillage-chemical weed control replaced conventional tillage practice. A further tenfold reduction in erosion was measured for a green cane harvest-residue retention management system. Significant increases in cane yield and ease of weed control for the green cane harvest practice were partially offset by increased harvesting costs and cane losses, illustrating deficiencies in existing harvesting machinery.

Salinity. Vertical drainage rates in Lockyer Valley soils were assessed as part of a study on the effect of irrigation-water quality on soil salinity. Calculated drainage below the agricultural root zone ranged from 5 to 300 mm/year, showing that in some soil types substantial aquifer recharge can occur from vertical drainage through the soil profile. It had previously been thought that recharge was dominated by leakage from perennially flowing creeks.

These results have important implications for catchment, soil and water-resource management in the Valley. For example, soils with high drainage rates can be irrigated with higher salinity waters without incurring serious yield reduction. Moreover, the amount of new salt imported into the aquifer systems from stream-bed leakage may be small, thereby extending the useful life of the aquifers.

Engineering effort

Considerable engineering effort was devoted to minimum (conservation) tillage machinery and techniques. The data obtained should be invaluable for farmers and machinery manufacturers in years to come. A DPI engineering team completed a programme of 25 field days in which it demonstrated tractor operations and fuel-saving techniques. Apart from giving farmers techniques to save fuel and therefore money, the field days drew attention to the work of DPI engineers.

Fisheries highlights

Prawn research

Intensive tiger-prawn sampling around Mornington Island was completed in January 1984. A marked peak in recruitment of juvenile prawns to the inshore seagrass nursery grounds occurred in June and July 1983, with migration to the fishery taking place in late summer. Maps of the distribution and abundance of seagrass were being prepared.

A prawn resources survey on the Saumarez Plateau by a commercial fisherman was assisted by Burnett Heads research staff. Valuable resources of eastern king prawns were identified east of the Swain Reefs, and a potentially commercial resource of the little known giant scarlet and red prawn species was found in water depths of 600 to 700 m.

Research vessel

The research trawler *Gwendoline May* was extensively employed in the Gulf of Carpentaria and northern Barrier Reef waters, where she undertook prawn, squid and deep-water exploratory work. Throughout her first operational year, the vessel proved to be a comfortable and efficient working platform, clocking up 134 sea days. New facilities included colour radar, satellite navigation and an Omega position-fixing system.

Beam-trawling studies

A study on the impact of estuarine beam trawling, upon both otter-trawl and recreational fisheries in the area adjacent to the Burnett River, was completed. It was shown that the capture of estuarine-distributed prawns resulted in a gross loss in dollar terms to the whole fishery. The beam-trawl fishery, by capturing juvenile fish, particularly bream and flathead, was shown to have the potential to affect recreational fisheries. Consequently, a recommendation was made that beam trawlers reduce their fishing effort. A similar study in Moreton Bay was nearing completion.

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. A 12-month pilot programme on the sand-crab fishery was concluded. Its findings will be of value in a larger-scale assessment of the conflicts between the users of this resource.

A small-scale fishery for spanner crabs (*Ranina ranina*) was developed in south-east Queensland and was producing an estimated 250 t of crabs annually, valued at about \$300 000. During the last year, 31 routine sampling trips were carried out as part of a project to provide management information on this new fishery.

The status of the spanner crab resource was monitored through a voluntary log-book programme. Management recommendations from the project (including a minimum legal size and a prohibition on the taking of ovigerous or egg-bearing female crabs) were recently promulgated as part of the new Fisheries Act.

Squid

Squid are a potentially significant resource along the Queensland coast. The occurrence of edible squid species in

Some fish species—such as tuna, darts, trevally and mullet—are not used to their full market potential by Queensland fishermen. Fish researchers at the DPI Research Laboratory at Hamilton, Brisbane, have developed this experimental filleting procedure to determine the best handling procedures for these fish species. Early results from this DPI research show promise of improving the quality of fish products and extending their storage life.



Queensland was being studied, and a 2-year field study of the life history of squid in Moreton Bay was concluded. The results of this study were being analysed.

Gill-netting studies

Commercial gill-netting in inshore waters and estuaries is the State's second most valuable fishery. Barramundi is the most important fish taken in this multi-species fishery.

A study at 15 locations on the eastern coast from Cairns to Bundaberg was in its third and final year, assessing the impact of management regulations on fish stocks. The biological data collected were being supplemented by data from a voluntary log-book scheme operating among commercial fishermen. Summaries of research findings should be available within 12 months.

A similar resource stock-monitoring programme in the Gulf of Carpentaria and the north-east Pacific coast found that catch rates of juvenile barramundi were markedly higher than in previous years. The present management regime of a summer barramundi closure appeared to be responsible for this breeding success and should lead to better commercial catches.

Barramundi pilot hatchery

Cairns and Walkamin staff experimented last summer in fingerling production, using techniques adapted from Thailand. Based on some promising early results, a pilot hatchery programme will be undertaken next summer at new impoundment facilities at the DPI's Northern Fisheries Research Centre, Cairns.

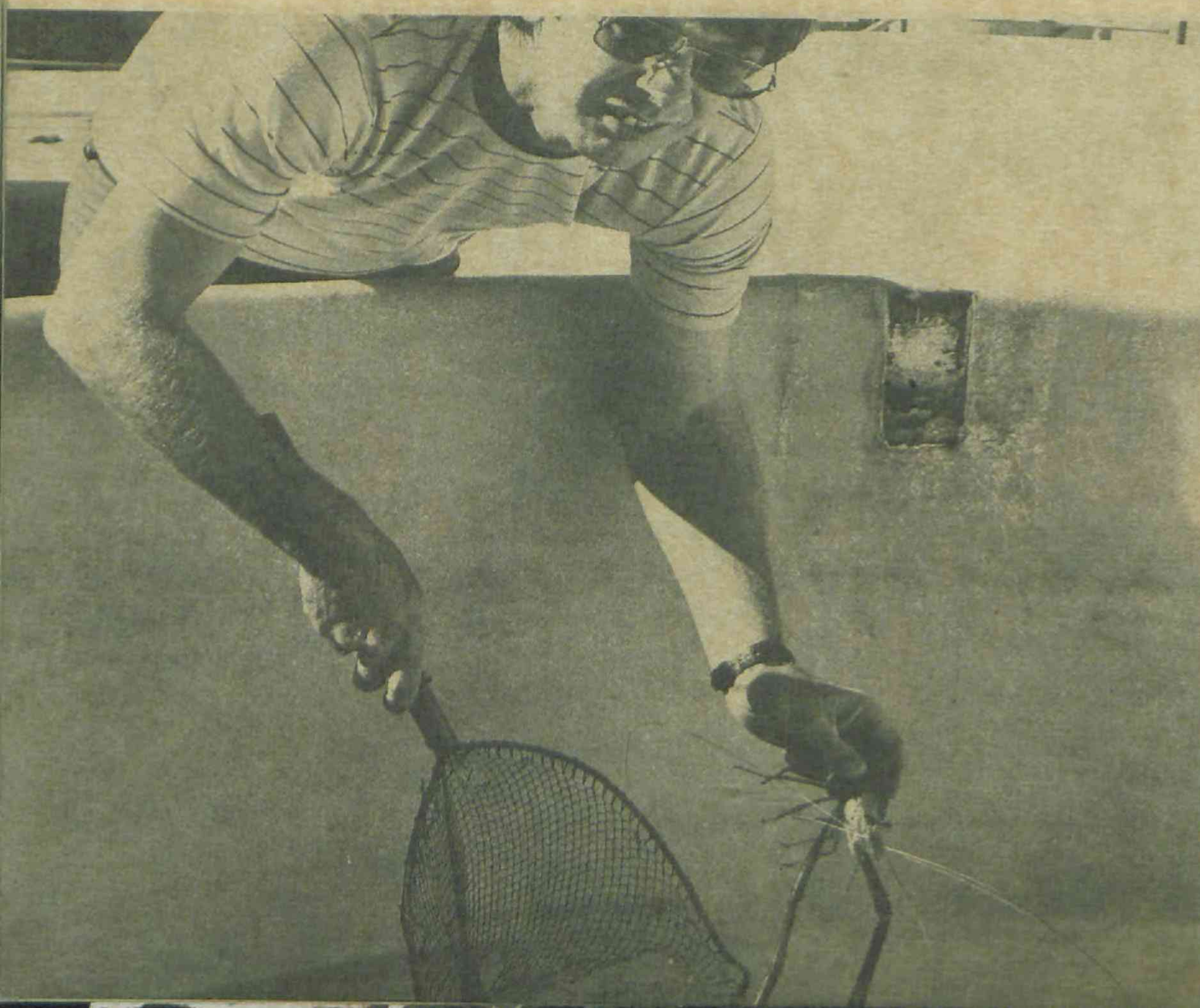
Demersal reef fish

Preliminary analysis of the ovary samples from seven reef-fish species of major interest to commercial and amateur fishermen suggested that all species were spring to summer spawners. Lengths and ages at maturity were being determined, especially for the spangled emperor (*Lethrinus nebulosus*), small-mouthed nannygai (*Lutjanus sanguineus*) and slatey sea bream (*Plectorhynchus pictus*).

Pelagic fish

A Taiwanese gill-net fishery operates within, and adjacent to, the Australian Fishing Zone. A limited tagging programme was undertaken to examine the possible effects of this fishery on Queensland stocks of narrow-barred Spanish mackerel. About 600 Spanish mackerel were tagged in the Torres Strait and southern Gulf of Carpentaria. To date, only two recaptures, both showing limited movement, had been reported by Queensland fishermen.

A DPI biologist examines the growth of a large freshwater prawn, one of the species being studied in the DPI's aquaculture programme.



Tuna potential

The potential of tuna and other high-value species from Queensland waters as exports to the lucrative Japanese sashimi (raw fish) market was assessed in a 7-month study tour. Japanese fishing methods and handling techniques were also studied to maximise product quality. There were no technical problems to prevent access to the Japanese market or valuable new markets identified in Hawaii and the United States West Coast.

Ciguatera research

Ciguatera is a form of food poisoning. It results from eating certain fish from coral reefs that become toxic because of blooms of a microscopic algae known as *Gambierdiscus toxicus*. The distribution of the organism along the Queensland coast was surveyed over the last 12 months. The

requirements for growth and toxin production by the organism were being studied in laboratory culture to produce more toxin for research. A related programme was examining the effect of reef disturbance from harbour dredging on the ciguatera problem.

Nile perch developments

All capital works associated with the Nile perch quarantine complex at the DPI's Walkamin Research Station on the Atherton Tableland were completed in May. These works comprise ponds, a laboratory, a water treatment plant and security arrangements to prevent the premature release of the fish. The complex had to be fully operational before the Commonwealth quarantine authorities could approve the importation of Nile perch, a consignment of which was expected from Africa in late 1984.

Freshwater fisheries

Native freshwater fish programmes were expanded with pilot studies on the breeding of barramundi and jungle perch. Techniques for collecting barramundi close to spawning were investigated and the existence of a link between spawning and lunar-tidal cycles was corroborated.

Hatchery production of sooty grunter continued, and 60 000 fingerlings were stocked to Tinaroo Dam. The success of some previous stockings was evaluated by sampling in the Annan River, and in Copperlode, Tinaroo, Awoonga and Fred Haigh dams.

Aquaculture

Public- and private-sector interest in aquaculture continued to increase, with 1 100 enquiries receiving attention at the DPI's Southern Fisheries Research Centre at Deception Bay. The majority were requests from the general public to acquire stock for farm dams for recreational purposes.

Experimental facilities were established at Cairns and Deception Bay to provide staff with expertise in aquaculture practices and to investigate the potential of various species under Queensland conditions.

Fisheries management

During 1983-84, a Fisheries Management Branch was established within the DPI's Division of Dairying and Fisheries. Its responsibilities include administration of reserves for fisheries purposes and the identification of areas for new reserves; licensing and surveying of oyster, coral and shell-grit leases; compilation and maintenance of fisheries statistics for Queensland; fisheries information and extension; economic and marketing aspects of fisheries; advice on fisheries management strategies; and research and advice relating to loss of habitat and fishing grounds in Queensland.

Eighteen new fish habitat reserves were added to the 16 existing reserves. These new reserves protect important habitat and fishing grounds for barramundi in northern Queensland and mud crabs in central Queensland. A new category of protection called the 'wetland reserve' was introduced and 21 such reserves were declared.

Fisheries production statistics were being collected from most of the Queensland fish processors. This was being done in conjunction with the Queensland Fish Management Authority. A pilot log-book programme began within the Moreton Bay Region to collect information on catch and effort from all types of commercial fishing.

Young visitors get the feel of fisheries research at an open day at the DPI's Northern Fisheries Research Centre in Cairns. The tank is part of an aquaculture study of red emperor.



This programme was in addition to the existing northern-prawn, Gulf and east-coast gill-net fisheries log-book programmes. The information was required urgently to assist in monitoring and maintaining a balanced, viable industry in the State.

Economic surveys were continuing in sectors of the commercial fishing industry. A survey of otter trawlers in southern Queensland showed that most owners failed to earn a return on capital. A crabbing industry study revealed a decline in the financial position of sand and mud crabbers in southern Queensland. A survey of the oyster industry was begun and, although not completed, it showed that few people had a full-time commitment to the industry, most being part-timers.

Recreational fishing in Queensland is an important component of fishery resource exploitation. A special Recreational Fishing Advisory Committee was established to maintain cooperation and coordination between the sectors of this industry.

Fish quality research

The fish-quality research group was becoming known throughout the fishing industry for its capability to tackle a wide range of post-harvest problems in the fishing industry.

A smoked tuna product was produced from both yellowfin and longtail tuna. This low-cost, ham-like product was an off-shoot of research into tuna for the lucrative Japanese sashimi market.

A DPI fish researcher at the Research Laboratory, Hamilton, Brisbane, checks the temperature in a smoking-oven made by modifying an incubator. DPI research indicates that the smoking of fish—particularly tuna, mullet, taylor, mackerel and eels—can improve their market acceptability and enhance returns to Queensland fishermen.



Review of marketing legislation

A comprehensive review of the *Primary Producers' Organisation and Marketing Act* began.

Introduced in 1926, the Act is

the legislative base for the operations of most marketing boards and statutory producer representative organisations.

The review objective is to examine closely the contents of

the Act and to identify the need and scope for changes likely to increase the ability of the boards and organisations to meet producers' needs successfully, to respond to the challenges of an increasingly complex commercial environment, and to be appropriately accountable to Parliament. The review was being undertaken in close consultation with the Council of Agriculture.

Marketing and economics highlights

Sugar industry poll

In April, a poll of the State's 6 000 sugar-cane growers was taken on the Queensland Cane Growers' Council's proposal to levy cane growers to allow it to become involved in the fertiliser industry. More than 80% of growers voted. Almost two-thirds of the votes supported the levy, which will now be imposed at a rate of 6c/t on all cane from assigned lands supplied to Queensland sugar mills for two consecutive seasons ending on 28 February 1986. The money from the levy will be used to subscribe capital to a primary producers' co-operative association, which will acquire a majority shareholding in North Queensland Fertilizers Pty Ltd.

Industries Assistance Commission enquiries

Evidence was presented to IAC hearings into the dairying and wheat industries, held to hear evidence on the IAC's draft reports on these industries. Evidence had previously been given at the main hearings. Evidence also was presented to the IAC's enquiry into the Rural Adjustment Scheme.

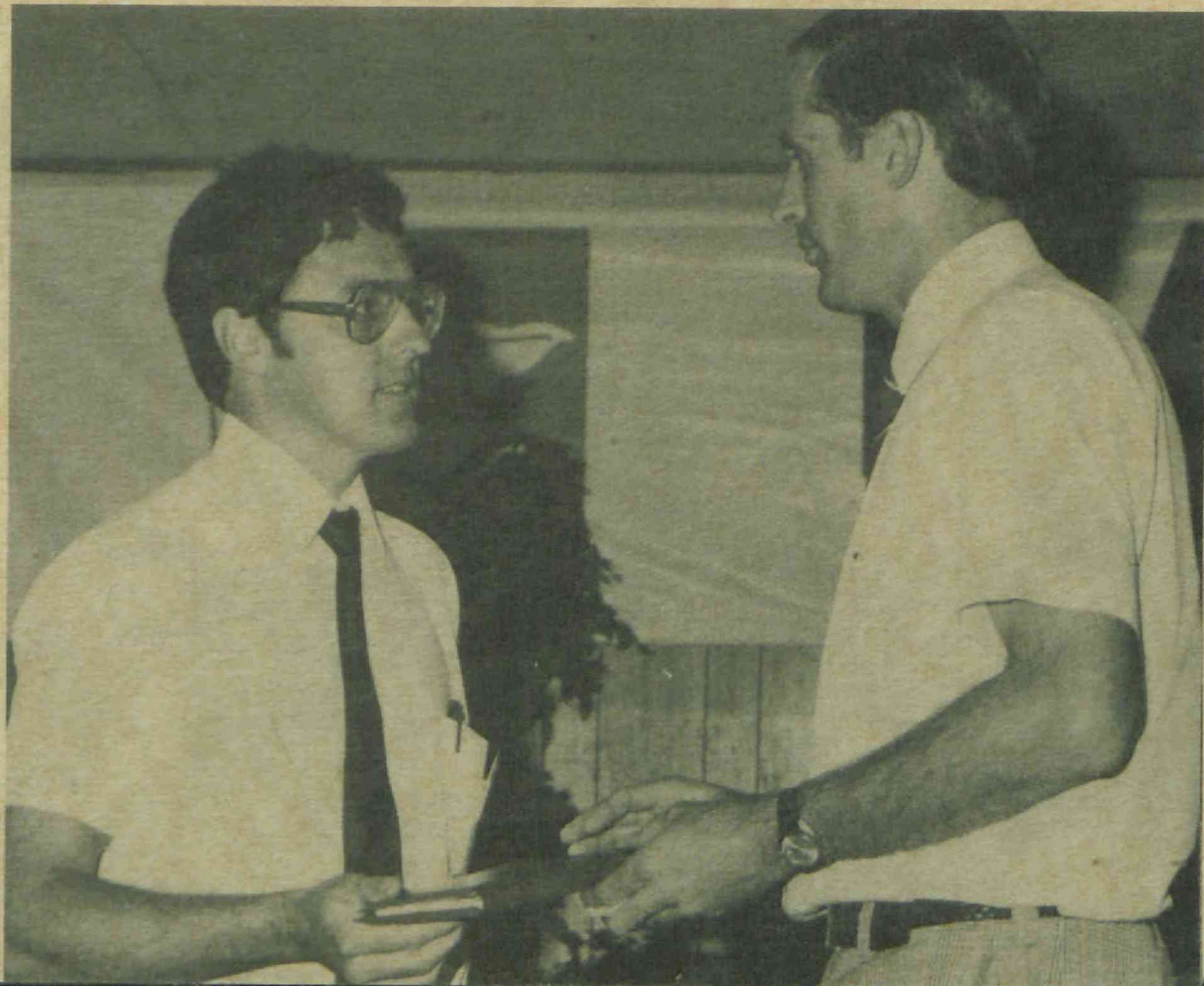
Wheat marketing plan

After the release of the IAC's *Report on the Wheat Industry*, the Standing Committee on Agriculture formed a working group to recommend on the next Wheat Marketing Plan. The DPI was represented on the working group, whose recommendations were presented to a meeting of the Australian Agricultural Council. Subsequent discussions took place between the Commonwealth, the states, the industry and other interested groups. Complementary Commonwealth/State legislation was expected to be introduced later in 1984 for the next 5-year Wheat Marketing Plan starting on 1 October 1984.

Grain handling and storage charges

At the Queensland Grain Handling Authority's request, DPI officers made an independent study of the equitable application of handling and storage charges in Queensland. Discussions were held with all grain industry sectors, and a draft report was presented to the Authority in early May.

The 1983 National Pig Fair-Barastoc Overseas Travel Award was won by Mr Jim Sloane (left), DPI regional agricultural economist in Toowoomba. Mr Lyn Davies (right), general-manager of Barastoc Products, presented the award to Mr Sloane for his work on pig recording schemes. The award enabled Mr Sloane to spend 3 weeks in Canada and 4 weeks in the United Kingdom studying the use of microcomputers in the efficient management of piggeries.



Export inspections

The first commercial shipments of citrus were exported to Japan in September 1983. The fruit were favourably received and further orders were to be filled from Queensland's 1984 citrus crop. These successful shipments followed many years of negotiations and trial work on disinfestation treatments and shipping procedures.

Fresh fruit and vegetable exports were down overall due to poor seasonal conditions, but placements of broccoli, fresh ginger and Chinese cabbage were up because of new market developments in the Middle East and South-East Asia.

Prescribed grain exports (barley, wheat and sorghum) increased from 1.4m t in 1982-83 to 1.9m t in 1983-84. The main increases were in barley and wheat exports and resulted from improved production conditions in the last 9 months of the year.

Spray drift damage

Complaints lodged under the *Agricultural Chemicals Distribution Control Act* 1966-1983 increased markedly to 71. Amendments to the regulations made under the Act were to operate from 1 July 1984 and were expected to be effective in reducing damage from the drift of chemicals.

Certified seed

Production of certified pasture seed increased by about 20%.

A **seed-testing** laboratory was opened in Mareeba to augment the service provided in Toowoomba and Brisbane.

Water resources developments

Water resource development projects on the Maranoa, Mackenzie, Flinders and Proserpine rivers, and on Lockyer and Quartpot creeks were examined. The Proserpine River Irrigation Project report examined the benefits from irrigated sugar-cane, and looked at flood mitigation and the provision of future urban water supply to this rapidly growing tourist area.

Farm management and taxation

The DPI booklet *Farm Taxation* was added to the group of DPI saleable titles that deal with farm management and taxation. Copies are available from the DPI, the New South Wales Department of Agriculture, and the Australian Government Publishing Service through its Australia-wide bookshop chain.

Microcomputer extension courses, to introduce farmers to computers for farm use, were run at venues throughout the state during 1983-84. Each participant was allocated a computer to provide as much 'hands on' experience as possible. So great was the response to the courses that applicants exceeded available places.

Computer courses

Microcomputers installed in DPI regional centres were bringing modern computer technology within reach of all extension officers serving primary producers. To complement this development, the DPI ran 12 computer demonstration and awareness courses for primary producers.

Overseas research project

The DPI, in collaboration with the Papua New Guinea Department of Primary Industry, prepared and submitted a research project proposal to the Australian Centre for International Agricultural Research (ACIAR) to do an agro-economic survey of PNG's major tree crops. The project is designed to improve PNG's crop-monitoring capability and provide technical and economic information about its coffee, cocoa and coconut industries. It



will identify key industry statistics and measure the reliability and cost of collecting those statistics. The 3-year project will be funded by ACIAR.

Farm management award

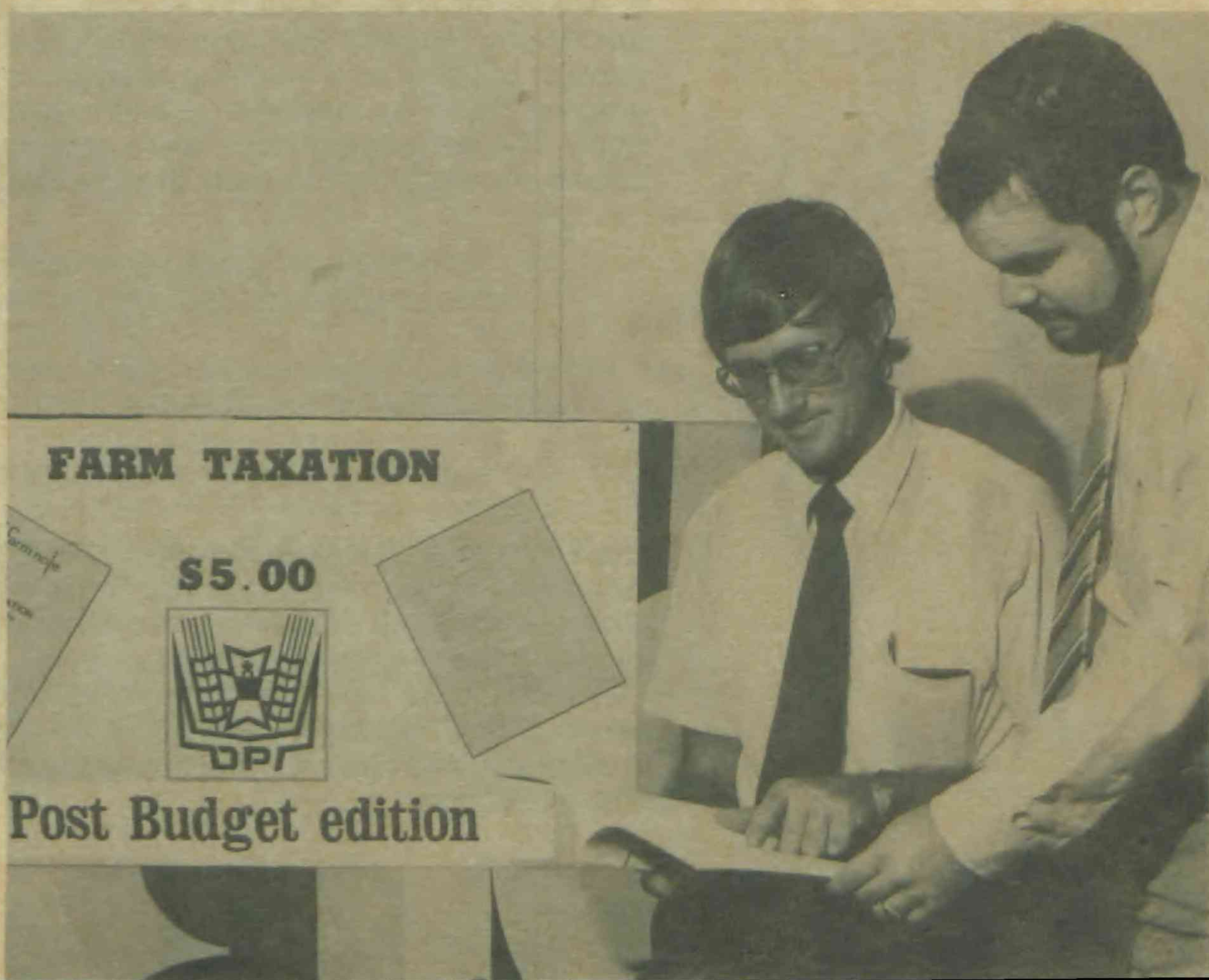
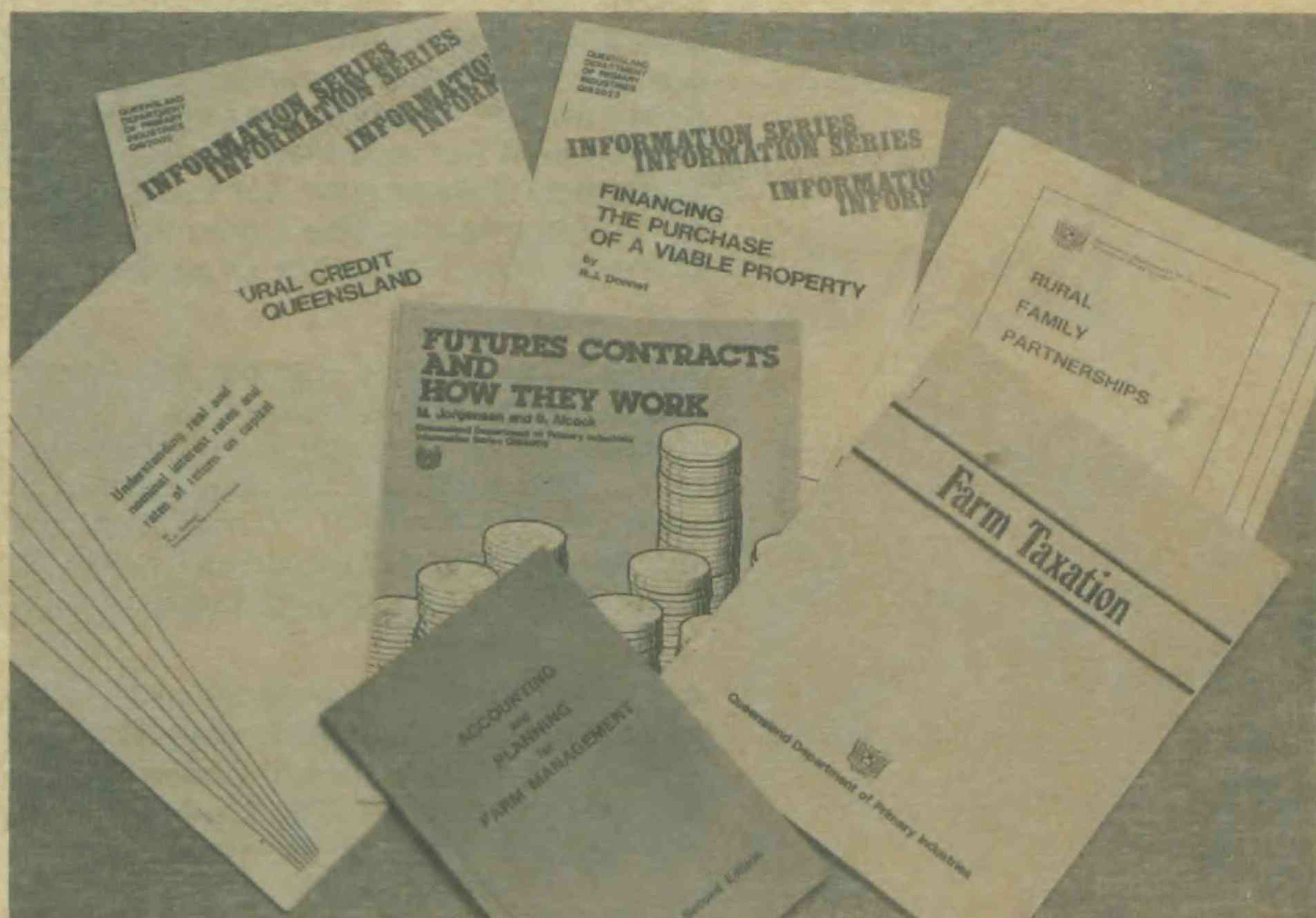
The DPI, together with the Royal National Association and the Commonwealth Development Bank, established an annual Farm Management Award. This award is designed to promote improved farm management on Queensland farms. Entries are judged on improvement in productivity over a 3-year period, with particular attention on productivity of resource use.

Evaluation of irrigation schemes

A review of the methodology for evaluating large-scale irrigation schemes and its application to such schemes in Queensland was completed. A bulletin was published, summarising the review results and containing examples that show how the evaluation techniques were used to measure the benefits and costs at national, regional and farm levels.

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

Farm Taxation is one of the DPI's most popular saleable books, available in Queensland from DPI offices and nationally through the Australian Government Publishing Service. A collection of 25 articles, it deals with income tax, sales tax and other taxes of concern to the primary producer.



Legislation

Amendments to legislation introduced during 1983-84 that are within the jurisdiction of the Minister for Primary Industries are set out below.

1. The *Fishing Industry Organisation and Marketing Act and Another Act Amendment Act 1984* transferred certain fishing industry management practices and licensing requirements from the Department of Primary Industries to the Queensland Fish Management Authority. These practices included the declaration of closed waters and closed seasons, specification of undesirable fishing apparatus, and protection of particular species of fish. The *Amendment Act* was the final step in a planned series of legislative changes aimed at placing the management of the Queensland fishing industry in the hands of an industry-based organisation.

2. The *Primary Producers' Organisation and Marketing Act and Other Acts Amendment Act 1984* provided for changes to three separate Acts. The most significant amendments related to the *Primary Producers' Organisation and Marketing Act 1926-1983*. This involved changes in the areas of Marketing Board membership, operation of affiliated cooperatives, auditing and accountability requirements, and annual reporting standards. An additional amendment allowed for further inclusions in the annual report of the Director of Marketing to provide for affiliated bodies. The *Amendment Act* repealed the superannuation provisions that existed under the *Fruit Marketing Organisation Act 1923-1982* as they related to the Committee of Direction of Fruit Marketing. The Committee is now subject to the superannuation provisions of the *Primary Producers' Organisation and Marketing Act 1926-1984*.

3. The *Stock Act and Another Act Amendment Act 1984* simplified the permit system associated with the movement of stock by introducing a 5-year concessional permit for persons responsible for the regular movement of stock within disease-free areas. This replaced the requirement that an individual permit had to be obtained for each stock movement. To maintain control over the movement of diseased stock, this *Amendment Act* provides for permits to be automatically cancelled upon notification of an exotic disease outbreak.

4. The *Wheat Pool (Validation of Proclamation) Act 1920-1983* was introduced in 1983 to validate certain Proclamations of the State Wheat Board. The Proclamations enabled the State Wheat Board to store, handle and treat various grains and oilseeds on behalf of the Queensland Graingrowers Association. This amendment clarified the State Wheat Board's dealings with grain and oilseeds other than wheat.

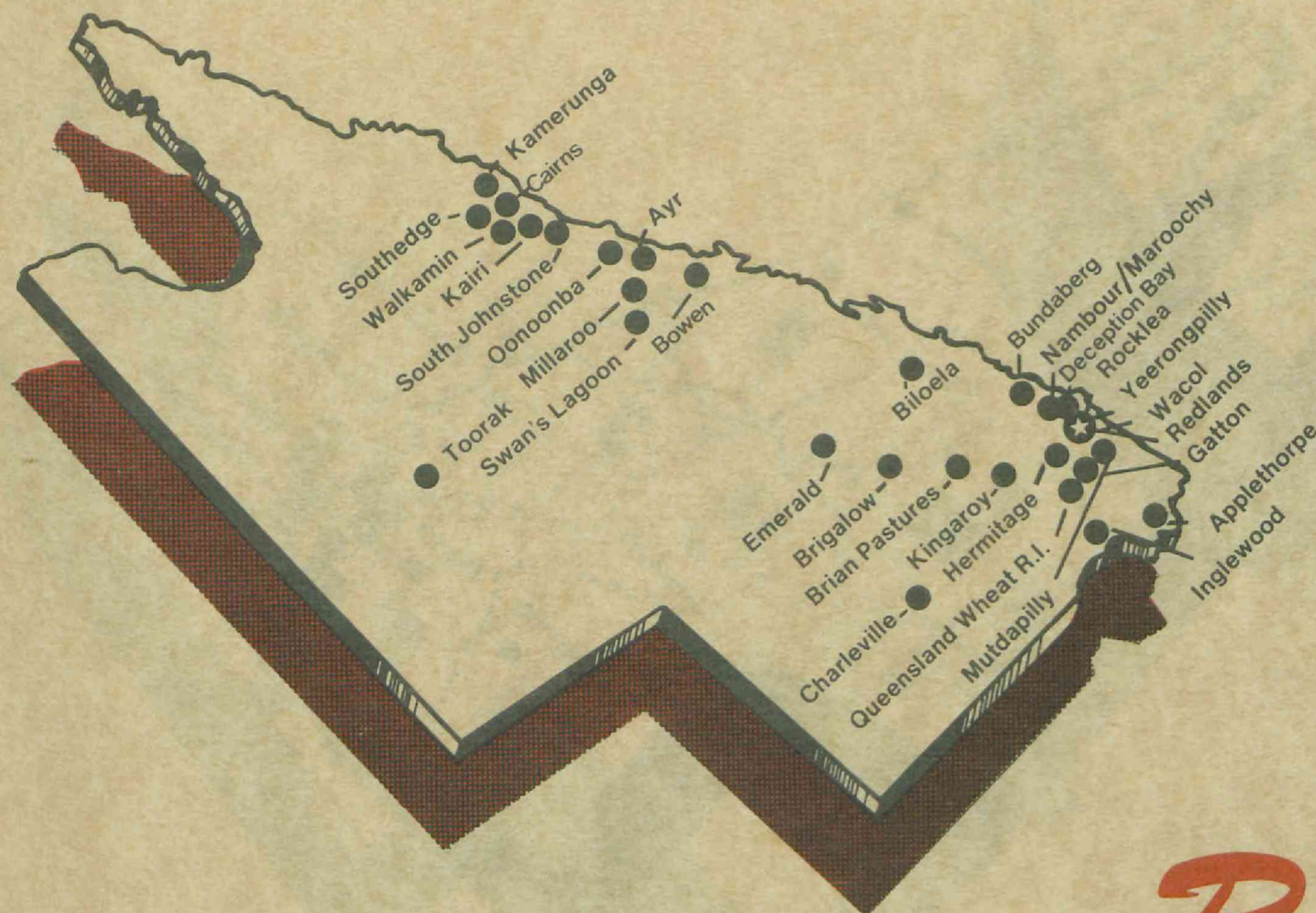
5. Amendments to regulations governing the marketing and grading of eggs under the *Poultry Industry Act* were introduced to define more clearly responsibility for the correct grading and marking of eggs; to provide for more effective monitoring of grading floors by inspectors; and to provide for a new system of weight grades for eggs. The new egg grades were approved after market studies by the Egg Marketing Board showed that the new grades would more effectively meet consumer needs.

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.

DPI research stations



AI Export Centre (Redlands)
 Animal Husbandry Research Farm (Rocklea)
 Animal Research Institute (Yeerongpilly)
 Artificial Insemination Centre (Wacol)
 Ayr Research Station
 Biloela Research Station
 Bowen Horticultural Research Station
 'Brian Pastures' Pasture Research Station
 Brigalow Research Station
 Charleville Pastoral Laboratory
 Emerald Field Station
 Fisheries Research Centre (Bundaberg)
 Fisheries Research Station (Walkamin)
 Gatton Research Station
 Granite Belt Horticultural Research Station (Applethorpe)
 Hermitage Research Station (Warwick)
 Inglewood Tobacco Research Station
 J. Bjelke-Petersen Field Station (Kingaroy)
 Kairi Research Station
 Kamerunga Horticultural Research Station
 Millaroo Research Station
 Mutdapilly Research Station
 Nambour and Maroochy Office/Laboratory Complex
 Northern Fisheries Research Centre (Cairns)
 Oonoonba Animal Health Station
 Queensland Wheat Research Institute (Toowoomba)
 Redlands Horticultural Research Station
 South Johnstone Research Station
 Southhedge Tobacco Research Station
 Southern Fisheries Research Centre (Deception Bay)
 'Swan's Lagoon' Cattle Field Research Station
 Tick Fever Research Centre (Wacol)
 Toorak Sheep Field Research Station
 Walkamin Research Station

Research

Although procedures for research projects follow a common pattern throughout the DPI, they are not completely uniform because of 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 or through the Research Stations Board. Regional groups are established within some branches.

Research facilities 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, fruit or tobacco);
- central laboratories operated by branches with a large service/diagnostic component and a variable amount of discipline-oriented research (for example, pathology and entomology);
- field experiments and surveys.

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.

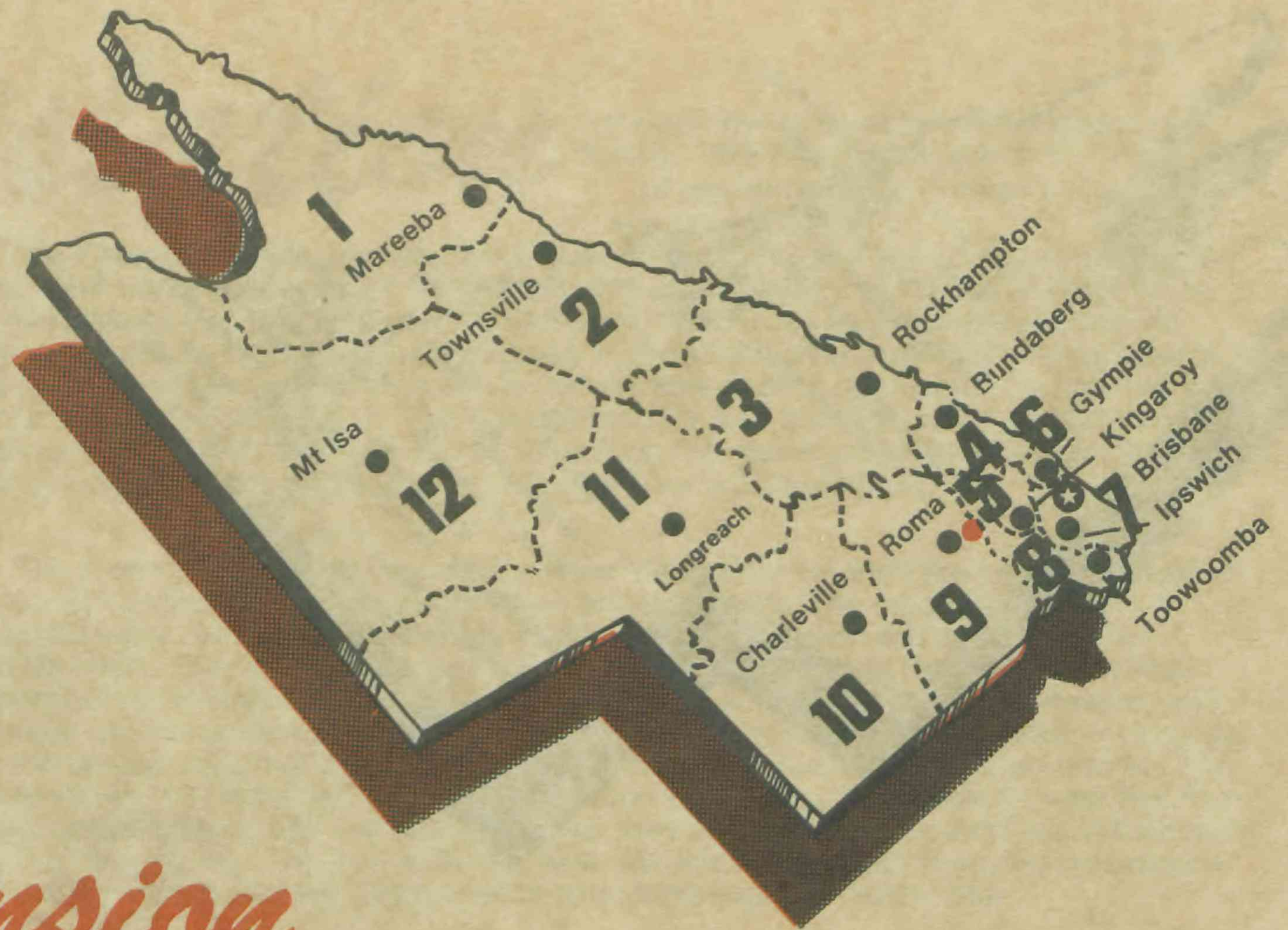
Much of the planning is done regionally, and branch and departmental priorities are determined from the overall advice received, except where Government priorities assume an overriding importance.

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.

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



Extension

The DPI's extension services help farmers to improve their productivity through adopting new or improved farming practices and through adapting existing resources to meet new goals.

The DPI services all rural industries except timber. It operates a coordinated, regionally based extension services system, which an Extension Services Branch administers within policies established by an Extension Services Board.

Each of the regions is divided into districts. Each region has a 'Charter of Operations' setting out the formal arrangements under which it operates and the guidelines for coordinating extension activities. Most regions have a full-time regional extension leader, who coordinates, assesses, develops and improves extension services to help Queensland primary producers.

Staff committees in each region ensure that extension activities are planned and coordinated. Many committees are industry based. Each committee involves producers in determining industry and district needs as a basis for extension activities.

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, the control of diseases and product hygiene and quality. These Acts include the *Agricultural Standards Act*, *Drought Relief to Primary Producers Act*, *Stock Act*, *Primary Producers Act*, *Wine Industry Act*, and *Veterinary Surgeons Board Act*.

DPI regulatory activities include:

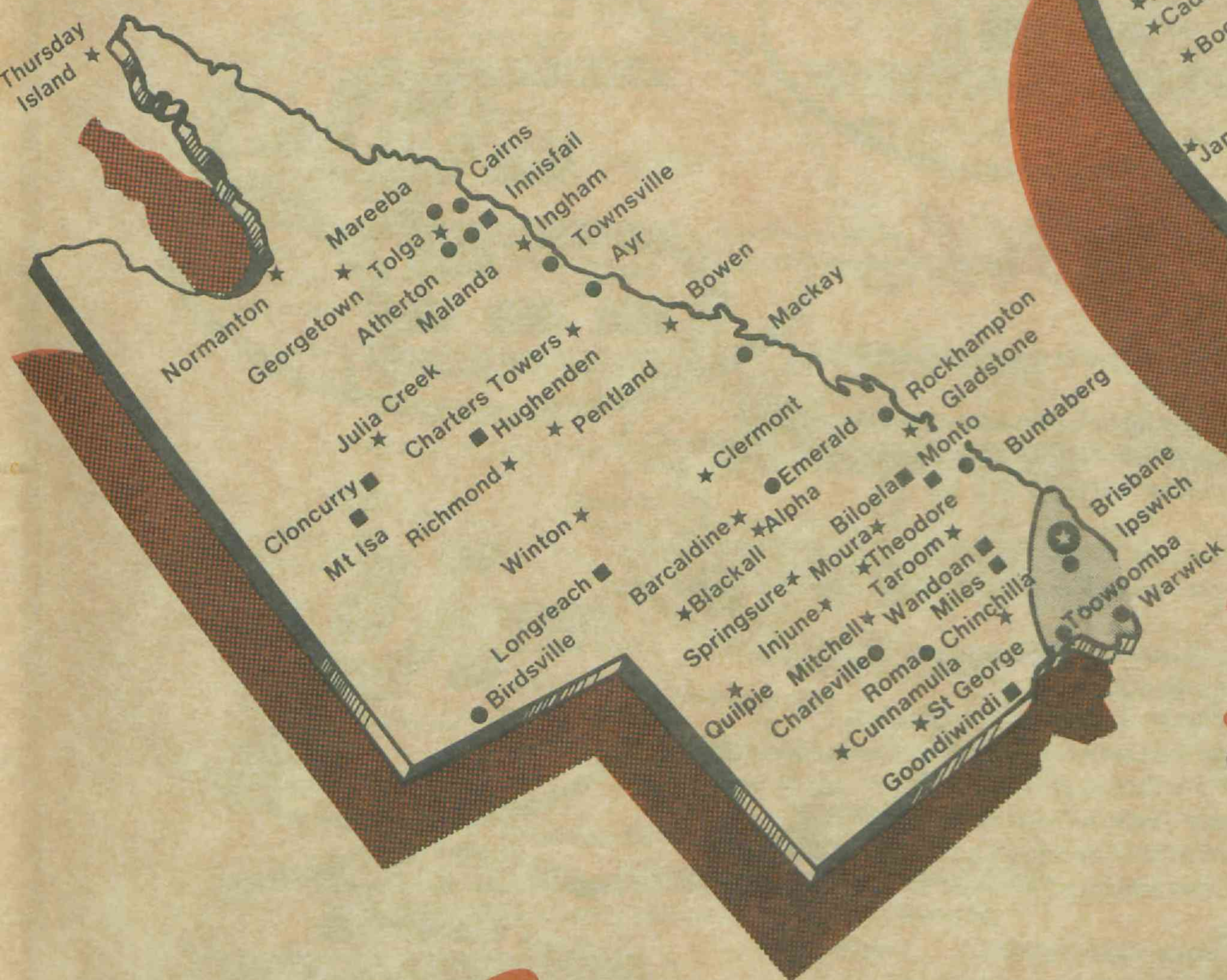
- supervision of meat slaughtering and meat quality for domestic consumption;
- issuing of permits to move stock;
- inspection of butcher shops;
- responsibility for quarantine of livestock and plants as agent for the Commonwealth Government;
- recommendations relating to the declaration of drought-affected areas;
- supervision of the activities of rural marketing boards and cooperatives; and
- quality assurance for all rural produce.

Officers carrying out a regulatory function are required to maintain the effectiveness of the Acts for the benefit of farmers and of the community as whole.

DPI country offices

(not including research stations)

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



DPI country offices, south-east Queensland

(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;
- 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 from more than 25 DPI centres throughout the State, covering the dairy, horticulture, pig, poultry, beef, sheep and field crop industries.

Saleable publications

Publications that the DPI sells are listed below.

General

Farm Management Handbook (6th edn) QM82014
Farm Management Handbook (6th edn) Part B QM82014C
Farming in a Small Way NSW8301

Journals

Queensland Agricultural Journal (2-monthly)
Queensland Journal of Agricultural and Animal Sciences (6-monthly)

Beef

Beef Carcass Composition and Meat Quality QI83002
Beef Cattle Breeds QM82011
The Beef Cattle Industry in Queensland QM81004
Beef Production on the Central Wet Coast of Queensland QI81001
Breeding for Beef Production BCHTB07
Crossbreeding Beef Cattle in Queensland BCHTB11
Queensland Beef Cattle Stud Breeders Directory QI84001
The Queensland Beef Industry from 1930 to 1980: lessons from the past QAJ vol. 109 No. 2 QAJ1092

Dairy

The Dairy Calf in Queensland QI83010
Dairy Cattle Research Techniques QM82017

Goats

The Angora Goat in Queensland QM83002
The Dairy Goat in Queensland QI81005

Pigs

Pig Housing Plans—selected reference drawings QM83005

Poultry

Register of Queensland Breeders of Fancy and Commercial Poultry QI84004

Animal health

Field Officers Manual (4th edn) ARITB82

Crops

Plant Tissue Culture QI84001
Tropical Tree Fruits for Australia QI83018

Crop protection

Economic Fruit Flies of the South Pacific Region (2nd edn) QM82008
A Handbook of Plant Diseases in Colour (Vol. 1)—*Fruit and Vegetables* (2nd edn) QI82011
A Handbook of Plant Diseases (Vol. 1)—*Current Recommendations* QI82011C
A Handbook of Plant Diseases in Colour (Vol. 2)—*Field Crops* QI78001
Herbicide Effects in Crop Plants ACBTB78
Insect Pests of Field Crops in Colour QI83013
Insect Pests of Macadamia in Queensland QM81007
Pesticide Application Manual—an information resource for plant protection QI83019
Principles of Crop Protection QM82002
Queensland Weed Seeds QM81013
Weeds of Queensland BOTTB79

Equipment

An Economic Investigation of Farm Machinery QB82003
Inventory of Agriculturally Oriented Software in Australia and New Zealand QB82012

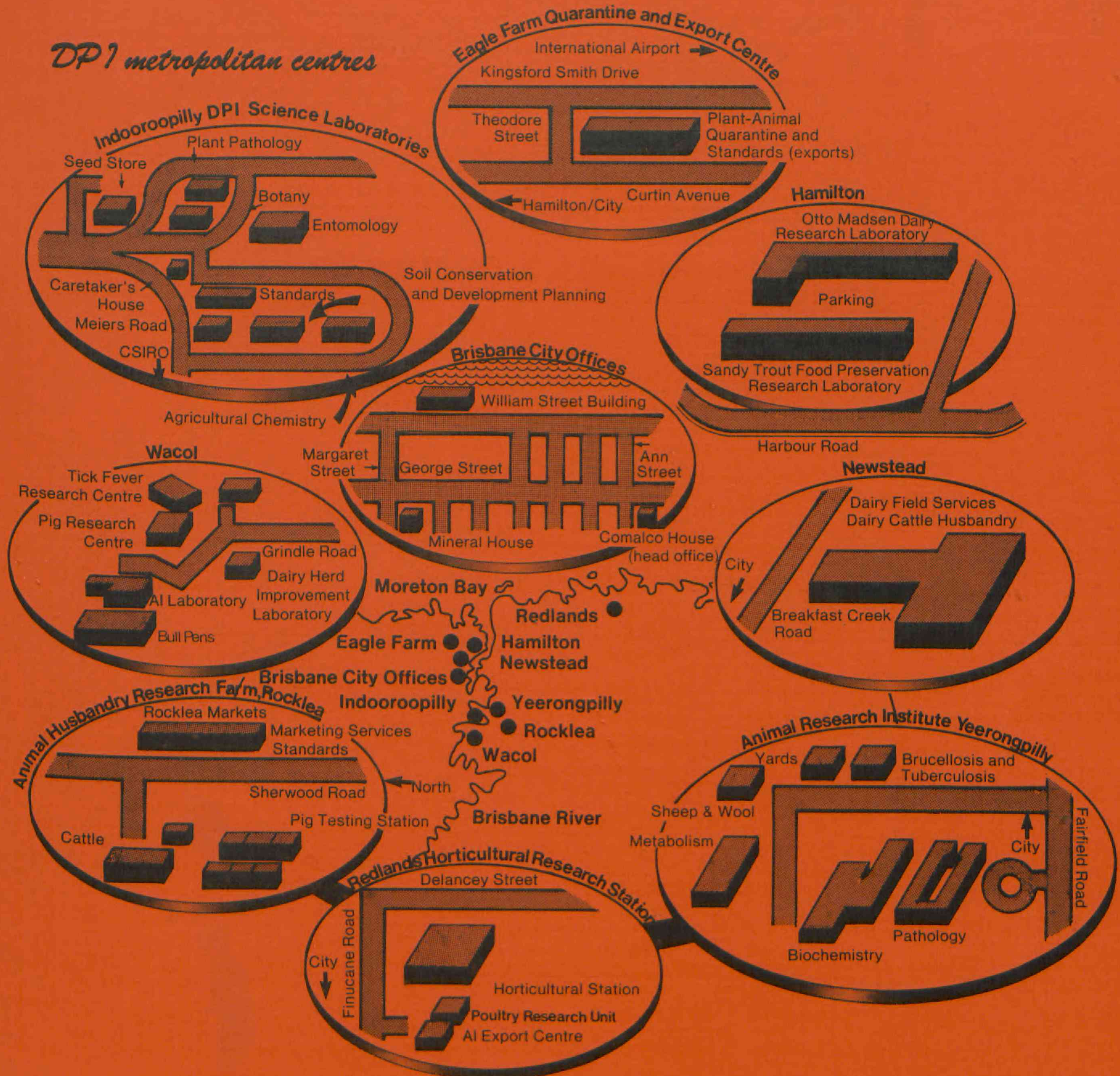
Feeds

Silage Management in Queensland QI83028
The Supplementary Feeding of Grazing Beef Cattle in Queensland QI83004

Financial management

Accounting and Planning for Farm Management (2nd edn) ECBTB71
Farm Taxation—Revised annually
Financing the Purchase of a Viable Property QI83001
Futures Contracts and How They Work QI84002
Rural Credit in Queensland (2nd edn) QI83009

DP1 metropolitan centres



Rural Family Partnerships Q183003
 Understanding Real and Nominal Interest Rates and Rates of Return on Capital QB82009
Fisheries
 The Commercial Fishing Industry of Queensland Q183017
 The Potential of Aquaculture in Queensland QC83012
 Report of the Committee on the Problem of the Crown of Thorns Starfish SGFED71
Home and garden
 Insect Pests in the Home Q184018
 Suburban Weeds Q183015
 Vegetables in the Home Garden (2nd edn) QM81006
Land use and resources
 Assessment of the Agricultural and Pastoral Potential of Queensland AGBTB27
 Biological Resources of Trinity Inlet and Bay, Queensland QB83004
 Shire Handbooks of Wambo, Jondaryan, Inglewood, Mareeba, Fitzroy, Waggamba and Noosa
 Soil Erosion Research Techniques QC84001
Vegetation
 The Flora of Lamington National Park QM81017
 Flora of South-Eastern Queensland Volume 1 QM81020
 Wildflowers of South-Eastern Queensland Volume 1 BOTTB77
 Wildflowers of South-Eastern Queensland Volume 2 BOTTB81
 New titles are continually being added. Information about these publications is available from the DPI
 Information Centre, GPO Box 46, Brisbane 4001. Telephone: (07) 224 6911.



Queensland Department of Primary Industries