Queensland Department of Primary Industries

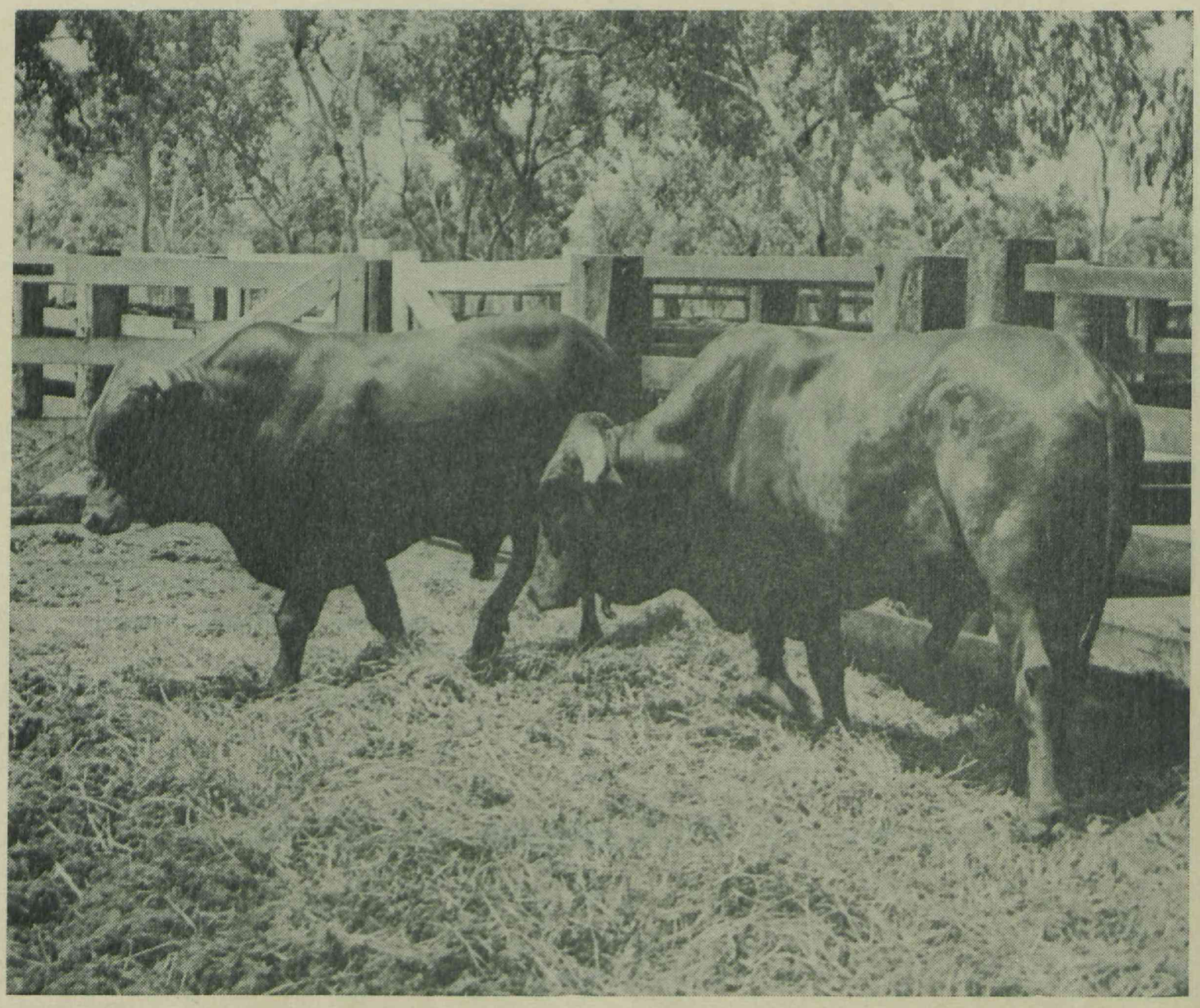
ANNUAL REPORT, 1967-68

The Department's Food Research Units at Hamilton, Brisbane—the Food Preservation Research Laboratory and the Otto Madsen Dairy Research Laboratory

Presented to Parliament by Command

A. 25—1968

One of the co-operative wheat fertilizer trials carried out on the Darling Downs to enable the nitrogen requirements of individual paddocks to be predicted from soil analysis.



Africander bulls used in the Department's beef herd improvement programme at Swans Lagoon Cattle Field Research Station on the Burdekin

CONTENTS

ORGANISATION OF THE DEPARTMENT AS AT 30th JUNE, 1968

MINISTER FOR PRIMARY INDUSTRIES .. Hon. J. A. Row, M.L.A.

CENTRAL ADMINISTRATION AND CLERICAL AND GENERAL DIVISION—

Director-General and Under Secretary .. J. M. Harvey, D.Sc., F.R.A.C.I.
Deputy Director-General .. .. .. A. A. Ross, M.Agr.Sc.
Chief Advisory Officer (Administration) .. C. L. Harris, A.A.S.A.
Director, Information and Extension Training Branch .. .. C. W. Winders, B.Sc.Agr.
Accountant .. .. E. C. R. Sadler, A.A.U.Q.
Executive Officer, Research Stations Section G. H. Allen, Q.D.A.

DIVISION OF ANIMAL INDUSTRY—

Director of the Division .. .. .. A. L. Clay, B.V.Sc.

Animal Research Institute—

Director of Veterinary Research .. .. J. W. Ryley, B.V.Sc.

Biochemical Branch—

Director of the Branch .. .. .. C. W. R. McCray, B.Sc., A.R.A.C.I.

Husbandry Research Branch—

Director of Husbandry Research .. .. J. G. Morris, M.Agr.Sc., B.Sc., Ph.D.

Pathology Branch—

Director of the Branch .. .. .. W. T. K. Hall, M.V.Sc.

Cattle Husbandry Branch—

Director of Cattle Husbandry .. .. G. I. Alexander, B.V.Sc., M.S., Ph.D.

Veterinary Services Branch—

Director of Veterinary Services .. .. L. G. Newton, B.V.Sc.

Sheep and Wool Branch—

Director of Sheep Husbandry .. .. A. T. Bell, B.V.Sc.

Slaughtering and Meat Inspection Branch—

Director of the Branch .. .. .. B. Parkinson, B.V.Sc.

Sections—

Poultry Husbandry (F. N. J. Milne, B.Sc., Chief Poultry Husbandry Officer); Pig Husbandry (F. Bostock, Senior Pig Husbandry Officer).

DIVISION OF DAIRYING—

Director of Dairying .. .. E. B. Rice, Dip.Ind.Chem., M.Inst.Biol.

Field Services Branch—

Director of Field Services .. .. .. W. D. Mitchell, B.Agr.Sc., Dip.Agric.Ext.

Research Branch—

Director of Research .. .. V. R. Smythe, M.Agr.Sc.

DIVISION OF DEVELOPMENT PLANNING AND SOIL CONSERVATION—

Director .. .. J. E. Ladewig, B.Sc.Agr.
Assistant Director .. .. A. Hegarty, B.Sc.

Development Planning Branch—

Director of the Branch .. .. .. A. Hegarty, B.Sc.

Soil Conservation Branch—

Director of the Branch .. .. .. J. Rosser, B.Agr.Sc.

DIVISION OF MARKETING—

Director of Marketing .. .. .. D. P. Lapidge, B.Com., A.A.U.Q.
Assistant Director of Marketing .. .. E. O. Burns, B.Com., A.A.C.A., A.A.S.A.

Economic Services Branch—

Director of Economic Services .. .. E. O. Burns, B.Com., A.A.C.A., A.A.S.A.

Marketing Services Branch—

Director of Marketing Services .. .. D. R. Lewis, B.Sc.(Econ.)

Standards Branch—

Director of Agricultural Standards .. .. A. C. Peel, Dip.Ind.Chem., A.R.A.C.I.

DIVISION OF PLANT INDUSTRY—

Director of the Division .. .. .. L. G. Miles, B.Sc.Agr., Ph.D.
Deputy Director .. .. S. Marriott, B.Sc.Agr.

Agriculture Branch—

Director of Agriculture .. .. .. B. L. Oxenham, B.Sc.Agr.

Horticulture Branch—

Director of Horticulture .. .. .. R. C. Cannon, B.Sc.Agr.

Agricultural Chemical Laboratory Branch—

Director of the Branch .. .. .. W. J. Cartmill, M.Sc., A.R.A.C.I.

Food Preservation Research Branch—

Director of the Branch .. .. .. S. A. Trout, M.Sc., Ph.D., F.R.A.C.I.

Sections—

Botany (S. L. Everist, B.Sc., Government Botanist); Entomology (W. A. McDougall, D.Sc., Government Entomologist; A. R. Brimblecombe, M.Sc., Ph.D., Deputy Government Entomologist); Plant Pathology (G. S. Purss, M.Sc.Agr., Government Plant Pathologist).

QUEENSLAND DEPARTMENT OF PRIMARY INDUSTRIES

Annual Report 1967-68

To The Honourable the Minister for Primary Industries

SIR,

I have the honour to submit the following report on the operations of the Department of Primary Industries for the year ended June 30, 1968.

Yours faithfully,

J. M. HARVEY,
Director-General.

General Comments

SEASONAL CONDITIONS

Unseasonal rain with record falls in some areas during June 1967 caused widespread flooding, particularly in the south-eastern sector. Drought-breaking rains also fell in the south-west and central districts, replenishing surface and underground water supplies. However, the far west, the central west from Richmond south to Winton and areas of the central Darling Downs remained droughted.

Dry conditions prevailed generally until the end of 1967. The weather was very hot during the last quarter, bringing fierce and widespread storms but no general relief.

Good rains fell during January and February of 1968 over much of the State, but did not extend into the central west or south-west, although many of the lower channels in the south-west were flooded as a result of runoff. Areas inland from Cairns and the central Darling Downs region remained drought-stricken. March and April were dry and hot. However, very widespread rains commenced in late April and extended into May, causing extensive flooding in western Queensland as well as northern and eastern coastal river systems.

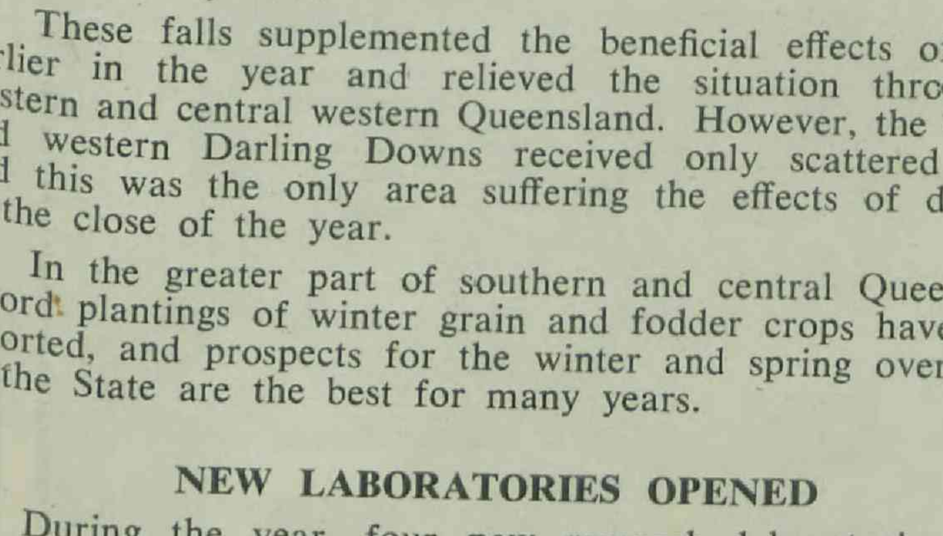
These falls supplemented the beneficial effects of rains earlier in the year and relieved the situation throughout western and central western Queensland. However, the central and western Darling Downs received only scattered relief and this was the only area suffering the effects of drought at the close of the year.

In the greater part of southern and central Queensland record plantings of winter grain and fodder crops have been reported, and prospects for the winter and spring over most of the State are the best for many years.

NEW LABORATORIES OPENED

During the year, four new research laboratories were opened.

The Otto Madsen Dairy Research Laboratory in Brisbane now houses the headquarters of the Dairy Research Branch. It is designed to provide completely new laboratories with ancillary pilot plant.



Portion of the Charleville pasture nursery, with the Pastoral Laboratory in the background.

Another new dairy laboratory is situated at Malanda, on the Atherton Tableland. It has important functions there following the changeover from butter to cheese and the widening ramifications of the milk industry.

Pastoral laboratories were opened at Gympie and Charleville.

The Gympie laboratory will serve a coastal, predominantly dairying area in which the newer tropical pasture species have begun to make a deep impression on production. It will concentrate on maintenance fertilizer and management requirements.

The Charleville laboratory will be concerned with pasture and forage improvement in the semi-arid country of the south-west and central-west. The main subjects of research will be pasture species introduction, establishment and management of pastures, water spreading, fodder cropping and management of native pastures and scrub.

BOTANY FACILITIES IMPROVED

Shortly after the first Department of Agriculture, under the control of the Minister for Public Lands, was formed in 1887, the Colonial Botanist (F. Manson Bailey) was transferred to the Department from the Queensland Museum. The association of the State's botanical services with the Department concerned with rural industries has continued over the intervening 81 years.

From the beginning, the botanical staff has given attention to economic botany as well as to describing and naming the unidentified native plants of the State.

In 1879, two years before he became Colonial Botanist, F. M. Bailey had been appointed to identify and describe useful native pasture grasses and poisonous plants in Queensland. This interest in economic botany continued throughout his life and he assembled exhibits of native fodder grasses and useful timbers, established a grass garden and published extensively on fodder plants, poisonous plants and weeds.

The six volumes of "The Queensland Flora" prepared by Bailey between 1899 and 1902 contained descriptions of some 5,500 native and naturalised plants. Although most of the descriptions were copied from Bentham's "Flora Australiensis", which had taken more than 15 years to prepare, Bailey added some hundreds of species not known to Bentham. This extensive work and other books and bulletins written by the indefatigable Bailey established him as one of the leading botanists of his day.

From Bailey's death in 1915 until 1917, his son J. F. Bailey was Government Botanist and then the office went to his grandson, Cyril White, who occupied the position until 1950. White's interests also ranged over a wide field, economic and taxonomic.

It was during his term that the Queensland Herbarium became a clearing house for botanical collections in the south-west Pacific region by Australian and American expeditions, financed by American institutions.

W. D. Francis, an associate of White, was an authority on rain-forest trees. S. L. Everist, who succeeded Francis in 1954, has built up a team of economic botanists with a major concern in poisonous plants, fodder trees, brigalow destruction and control and weed control generally.

A strong staff of systematists, with S. T. Blake as leader, has made notable contributions to the Queensland flora and has a new Handbook to the Queensland Flora under way.

The old herbarium in the Brisbane Botanic Gardens has after 56 years given way to a modern building at Indooroopilly, which was occupied towards the end of the financial year.

During the past five years alone, 166 botanists visited the old herbarium to work on plants of the south-west Pacific. Nearly half of these visitors were from institutions in Asia, Europe, Africa and North America.

A big task still lies ahead of the Botany Section. The new Handbook to the Queensland Flora is expected to take another 15 years to complete. Studies of fodder trees, poisonous plants and the control of unwanted woody plants such as limebush and eucalypts, and of troublesome herbaceous plants such as feathertop, are likely to extend further into the future.

COMMONWEALTH AID CONTINUED

Funds made available by the Commonwealth Government for the improvement of extension and regional research greatly assisted the Department during the year. The total allocation of $689,000 was used for a wide variety of purposes.

Additional staff were employed for regional extension co-ordination, regional research, research/extension liaison, field investigations and demonstrations, cattle tick control extension, sheep, pig and poultry extension, regional agricultural economic services, development planning extension, central information services and soil conservation services.

New plant and equipment for research stations were obtained for several research stations and provision was made for additional fencing and water reticulation at Toorak Sheep Field Research Station in the north-west.

Dairy industry projects, including group herd recording, farm demonstrations, infertility surveys, proving of dairy bulls, sire and herd surveys and artificial insemination, were continued with support from the Commonwealth Fund.

Information services, both central and regional, were strongly supported.

In-service training was considerably expanded through central and regional schools and conferences.

Numerous visits by technical officers to other States were made possible. These included studies of irrigation agriculture, fruit production, beekeeping, plant pathology, and fruit transport and storage, and attendance at technical conferences.

An entomologist visited New Zealand to study pasture pests and a cotton breeder made a study visit to the U.S.A. A veterinary officer was given the opportunity of studying for the Diploma in Animal Health at the Royal Veterinary College, London.

The continued expansion of the Commonwealth Extension Services Grant over the next two years is assured. The impact of Commonwealth aid on the Department's services and through them on primary production has already been very great and there is no doubt that additional funds can be used to great advantage.

INDUSTRY AIDS RESEARCH

Acknowledgment is made of direct and indirect contributions made by primary industries to research and extension operations of the Department.

Most of this support comes through five Commonwealth/industry research schemes jointly financed by the Commonwealth Government and the industry concerned.

The first group to accept the Commonwealth's offer to match funds contributed for research and extension was the tobacco industry, and funds have been provided annually since 1956. Queensland, as the main tobacco-growing State, receives a substantial allocation from the fund, mostly to the Department.

Wool research funds are divided among production, textile and economic research and the Department's share has not been a large one. However, the contribution is a useful one and last year permitted the establishment of the Charleville Pastoral Research Laboratory.

Wheat research funds available to Queensland are administered by the Queensland Wheat Research Committee. The bulk of the funds is expended on the Queensland Wheat Research Institute, which to date has been staffed wholly by the Department.

Meat research funds derive from a levy on all cattle, sheep and lambs slaughtered and are directed to research in the beef, mutton and lamb industries. The Department's beef research activities are strongly supported by these funds.

A levy on butterfat and the matching Commonwealth grant are allocated to organisations for the investigation of farm, manufacturing, marketing and distribution problems in the dairying industry. Most of the Department's share is allotted to the Otto Madsen Dairy Research Laboratory.

The fruit and vegetable industries have made very useful direct contributions of funds and equipment to the Department. Recent examples are undertakings by the Vegetable and Other Fruits Sectional Group Committee of the C.O.D. and a local growers' body to contribute to the operating costs of the new Bowen Horticultural Research Station.

The continuing financial support by the permanent funds and the special grants made from time to time by industries either directly or through commodity marketing organisations are extremely helpful to the Department in providing research and extension services to the industries concerned.

SERVICES TO FOOD PROCESSORS

The Department has long recognised that it can assist the economy of the primary industries by extending services beyond the production field into the field of utilisation of farm and station products.

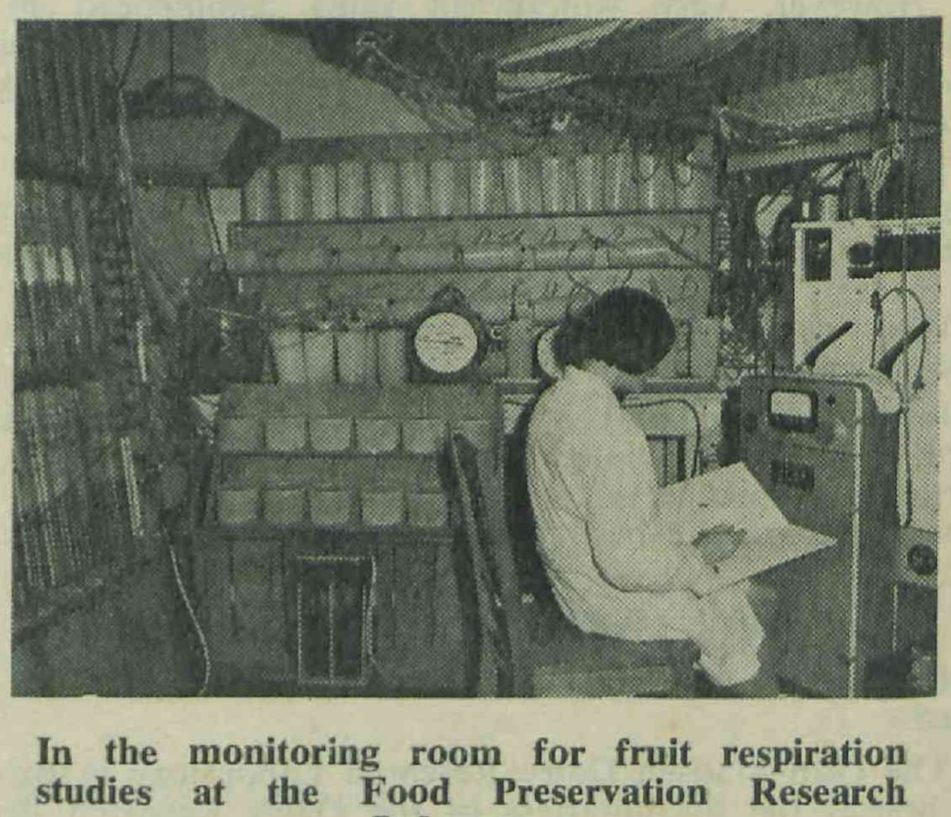
The handling and manufacturing industries have taken advantage of the services offered and in some cases have supported them financially.

For many years, the Division of Dairying has given extensive service to dairy factories in a variety of ways, from improvement of manufacturing processes to the development of new food products. For quality determinations alone, over 50,000 samples were analysed in the Division's laboratories last year.

One of the Division's services, the Butter Improvement Service, has been operating for over a quarter of a century, providing advice to factory managements on the basis of regular sampling.

The opening up of new export markets for dairy products has been followed by an expansion of the Department's testing services on behalf of exporters. These have related mainly to cheese for Japan, Junex for America and butter for the East.

The Department staffs the laboratory of the Egg Marketing Board and has rendered valuable service to the poultry industry by examination of egg products, particularly egg pulp.



In the monitoring room for fruit respiration studies at the Food Preservation Research Laboratory

The Department's Food Preservation Research Laboratory has as a major concern the utilisation of fruit and vegetables for canning, freezing and similar purposes. It has played a big part in developing manufacturing processes for ginger which have given the local industry a distinct advantage over imported ginger. It has conducted important utilisation research on pineapples, citrus fruits, passion-fruit, potatoes and other horticultural products.

Handling and storage of horticultural products figure in the Laboratory's operations. One important commercial development, resulting from years of intensive investigation, was the gas storage of Delicious and Granny Smith apples which enables good quality fruit to be marketed in the late months of the year.

Amongst other services provided for handlers and processors of farm and station products are chemical analytical services to commodity marketing boards, marketing studies on raw and manufactured products, and grading of meat.

DEVELOPMENT PLANNING

The Department continued service assistance to the Land Development (Fitzroy Basin) Scheme, under which 100 ballot blocks have been taken up in Areas, I, Ia and II.

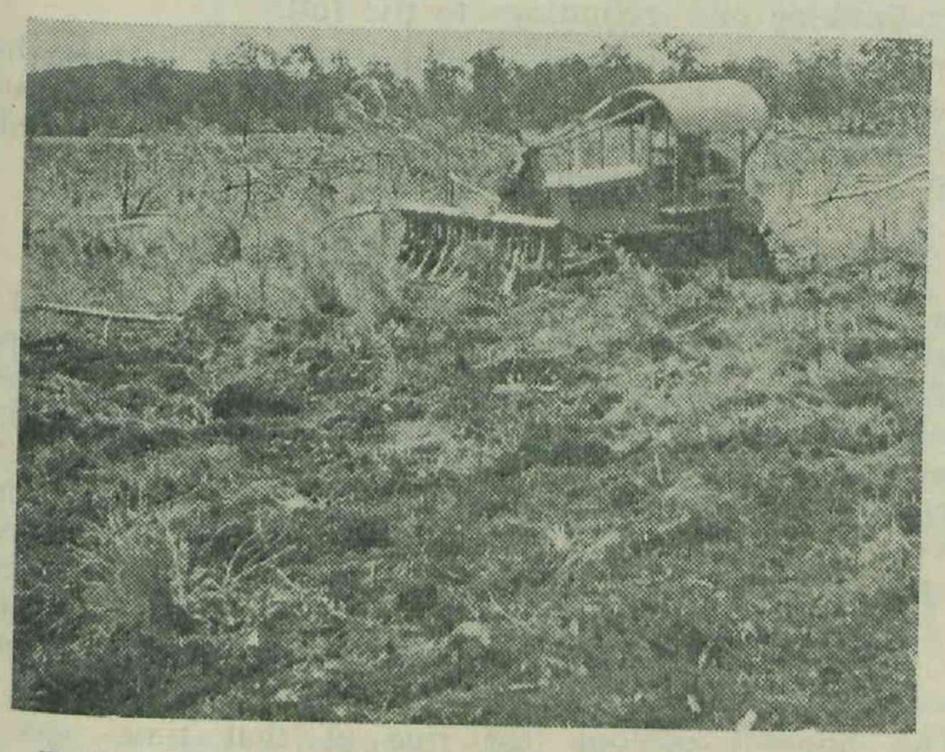
Base property plans for the 26 ballot blocks taken up during the year were drawn up, with land capability classifications superimposed and suggestions included for location of water points and fence lines.

Purchase recommendations covering a total of 68,000 lb. of Rhodes grass, green panic and buffel grass were made to the Land Administration Commission.

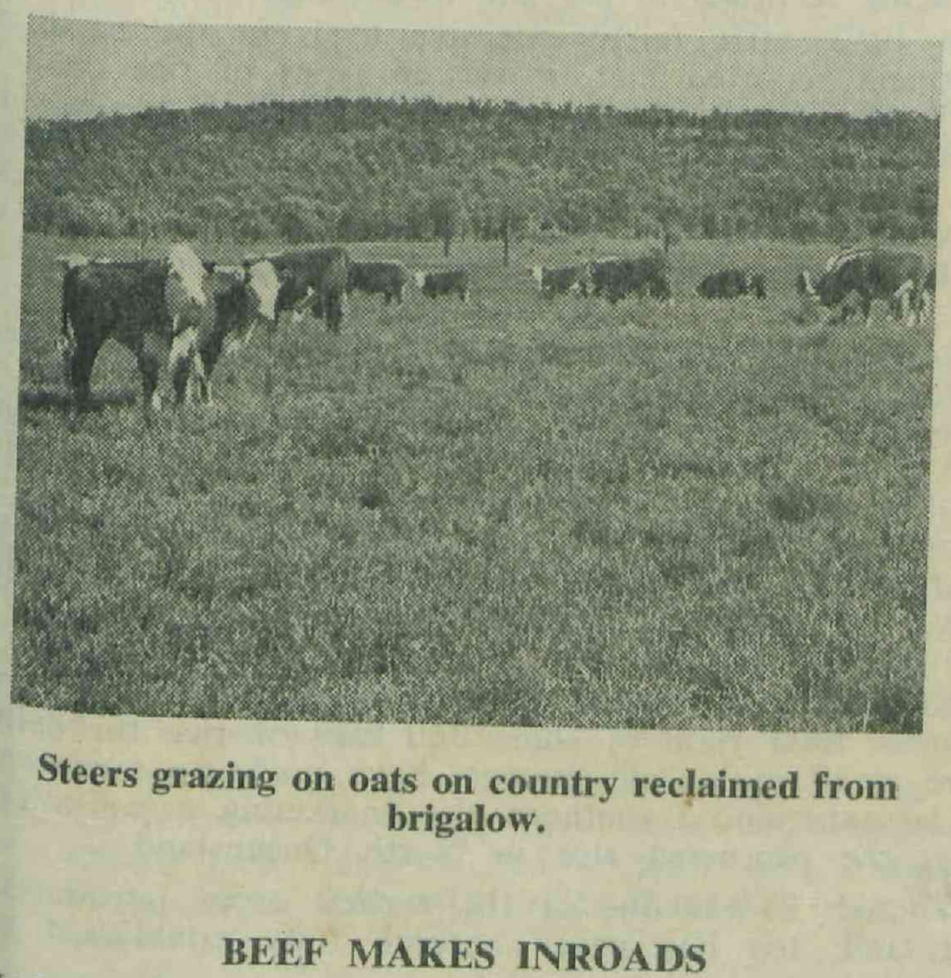
Departmental officers have been actively associated with land unit mapping activities in selected portions of Area III.

Evaluation of irrigation schemes for sugarcane in the Bundaberg-Isis region and North Eton (Mackay) area was made as a joint project with the Irrigation and Water Supply Commission. Reconnaissance soils investigations were conducted in these areas and in the Bowen-Broken Rivers area, the last in collaboration with the Department of National Development.

A technical guide on soils and land classification of about 1·6 million acres on the western Darling Downs is being prepared for the use of extension officers.



Private investment in the development of land for beef production continues.



Steers grazing on oats on country reclaimed from brigalow.

BEEF MAKES INROADS

Influenced by better market prospects, beef herds are being expanded or introduced on an increasing number of sheep and dairying properties.

Although climatic environments and beef production methods differ markedly between the sheep and dairying regions, the expansion of beef production in the two situations has a number of important features in common:

- Beef cattle productivity is high in comparison with older beef areas. In sheep areas this is related to the better quality of native pastures, with introduced pastures and crops making an important contribution in some regions. Improved fertilized pastures and forage crops are providing the basis for much of the expansion of beef production in dairying areas.
- Property owners who are developing new beef enterprises tend to make more use of the Department's extension services than established producers.
- In addition to technical information assistance in planning overall property organisation and management is required by a substantial number of these new beef producers. This is particularly important when beef production is one of several enterprises on a sheep-beef property or on a mixed farm in the higher rainfall region.

The expansion of beef production in wool-growing and dairying areas is likely to continue. It has important implications for the Department's extension service, in relation both to the number of producers demanding assistance and the breadth and depth of technical and managerial advice which they frequently require.

NEW BEEF BREEDS

The State's beef industry was founded on two main British breeds, Hereford and Shorthorn. For over a century it has been based on these breeds, with more limited use made of other breeds of similar basic type, Devon and Angus.

Beginning in 1930, the Zebu—specifically the American Brahman—began to markedly influence beef production in the State. It has been used as a means of new breed synthesis and in this respect the Droughtmaster of local origin and the imported Santa Gertrudis as intermediate breeds between British and Zebu types are significant developments.

The beef breed and type scene is again on the eve of significant change. The Africander, a Zebu type of African origin, is already becoming available, and the Charollais, a European type, and the Sahiwal, an Asiatic Zebu, are probably imminent.

The availability of a wider gene pool than previously available, from British, European, African and Asian sources, offers the possibility of using continuous crossbreeding methods aimed at the maintenance of hybrid vigour beyond the first generation. Hybrid vigour is a phenomenon associated with a cross between types that are markedly different and the greater the difference the greater the possibility of improved performance of the crossbreds. When only two basically different types are available, the maintenance of the vigour is virtually impossible.

The changed breed situation is likely to be of outstanding importance to breeders and to development of the industry, especially in northern areas.

TICK PROBLEM REMAINS

Efforts to contain the Biarra resistant tick have been continued but the problem has grown considerably.

Extensions have occurred around most previously known areas in the Brisbane Valley, Beaudesert, Beenleigh and Nambour districts and new foci have been detected at 10 other areas in the south-east.

The first outbreak of Biarra-type resistance in the north was confirmed at Mackay early in 1968.

Operation of the control programme has imposed a heavy strain on Departmental staff and finances. Over 30 inspectors are engaged primarily on the programme. Medicaments are costing over $30,000 a month.

Quarantine restrictions have been widely applied, but it is proposed to lift restrictions from 190 holdings which have completed treatment programmes if no ticks return during the spring months.

The programme operated smoothly during the year and there has been a notable change in the attitude of owners who were first involved in the programme. Many of these were previously critical but are now convinced of the advantages of keeping their cattle free from ticks.

DAIRY INDUSTRY TRENDS

The decline in dairy farm numbers which has been occurring over the past decade is still in progress. Concurrently, the total volume of production has remained relatively static. While there has been some significant improvement in animal productivity in the period through the use of better production methods, including the use of more fertilizer and improved pastures, probably the main contributing factor in the maintenance of total output from a smaller dairy farmer population has been the increase in the size of operations on many dairy farms. It is apparent that this tendency to increased scale in operations will continue.

Matters of particular significance in this industry growth pattern are the higher levels of capital investment, the attempts to hold labour input at minimal levels, the use of mechanical methods for the handling of feeds and products, and, most significant of all, the altered approach to management and decision-making by the farm operator.

For the extension officer supplying services in this situation, there is a corresponding need to adapt the advisory service to the new technology, and in this respect there is a growing need to widen the area of advice substantially. The new manager tends to have a need and a desire for advice that encompasses the whole of his operations and the best integration of the sundry elements of his operations.

CHANGES IN A.I. USE

The future picture of artificial insemination in Queensland appears to be one of decreasing tempo in the rate of expansion in the dairying industry and a quickening of interest in the beef industry.

In the calendar year 1967, some 65,000 dairy cows were inseminated with semen produced at the Department's Artificial Insemination Centre at Wacol. This was 16 per cent. higher than the 1966 figure. But there are indications that expansion will be at a slower rate in the future.

The use of artificial insemination in the beef industry is only in its infancy. The Wacol Centre has beef bulls on its strength and can quickly build up supplies of semen of various breeds as required.

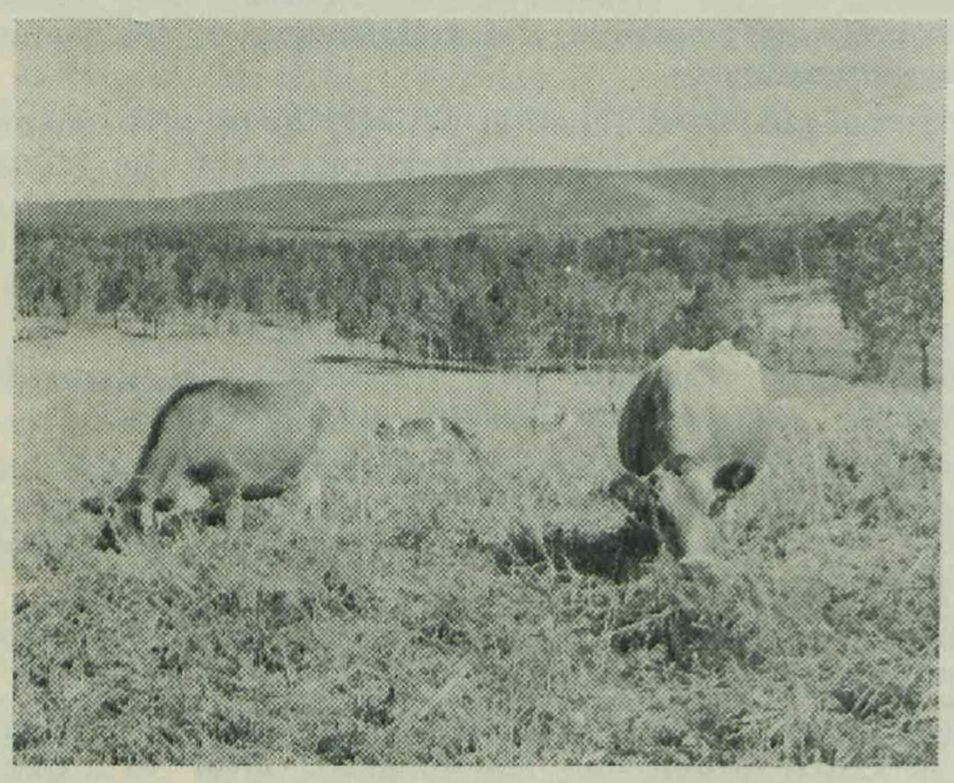
Some beef breeders have shown a desire to make more effective use of their own high-class bulls by using artificial insemination instead of direct mating. To meet this need, the Wacol Centre has introduced a new service—the custom freezing of semen. Already nine private beef cattle breeders using 16 bulls have availed themselves of this service.

DAIRY PASTURE SUBSIDY SCHEME

The Dairy Pasture Subsidy Scheme, which was commenced in 1966, received very good support in 1967-68. Approved applications, totalling 3,670, were 60% higher than in 1966-67.

The applications comprised 1,839 from farmers entering the Scheme for the first time and 1,831 from farmers who received approvals in the first year and made further application in 1967-68.

Claims paid during the year totalled $451,844, making a total disbursement of $630,762 since the Scheme began. Total area planted under subsidy since the commencement of the Scheme is estimated at 70,000 acres.



Dairy cows on pasture planted under the Dairy Pasture Subsidy Scheme.

If it is assumed that one acre of good sown pasture represents an increase in production of 100 lb. butterfat per annum, it is apparent that the Scheme is making a very real contribution to more efficient and thus lower-cost production.

MAINTAINING AGRICULTURAL PRODUCTION

The long-term productivity of arable areas is a matter of primary importance. Maintenance of soil fertility is attempted in two broad ways—by cropping systems with perennial phases and by the use of annual cropping with fertilizers.

Crop rotation systems are being studied on the grain-growing soils of the Darling Downs and the Atherton Tableland, where wheat and maize monoculture respectively have been practised for decades. In brief, the use of a 4-year lucerne-prairie grass pasture on the Darling Downs increased wheat yields as much as 54% over continuous wheat and grain protein content has risen by up to 36% with virtual elimination of mottling. The trials on the Atherton Tableland have not advanced to the same stage but evidence to date indicates that rotation with legume-based pastures will maintain yields of maize.

Major research programmes in plant nutrition comprise the nitrogen and phosphate prediction research in connection with winter cereal production in southern Queensland, the foliar analysis studies in North Queensland concerned with tobacco and maize especially, but also including potatoes, and the fairly well documented usage of nitrogen fertilizer with both raingrown and irrigated summer crops.

EXPANSION IN PLANT BREEDING

In a situation where the painstaking efforts of plant breeders are all too readily nullified by rapid changes in virulence of plant diseases, the introduction and evaluation of new concepts seem to offer additional hope.

On the one hand, the concept that environmental adaption and yield potential are separately inherited appears to offer a sound basis for selection of parental material for breeding purposes. Wider testing of large numbers of lines is essential in such a programme. This involves additional mechanization and labour, and use of computer facilities to the full in planning experiments and analysing results. To this end, action has already been taken to expand the testing of wheat, barley and linseed lines in a range of field environments.

In the case of wheat, stem rust disease is an over-riding factor. Varieties bred for immunity to rust tend to fail in a few seasons as the virulence of the disease changes. There is a school of thought that it would be preferable to produce varieties which are not immune to rust but which tolerate infection and achieve good yields under most conditions. The relative significance of immunity and disease tolerance is being examined in the current wheat breeding programme.

Other breeding projects have other aims. There is the need to improve lint strength and quality in high-yielding cotton varieties. Lodging of hybrid sorghums in the hotter and drier areas of Central Queensland must be overcome. Erect varieties of navy beans are necessary to allow direct harvesting of the seed. A rust-resistant maize hybrid is already in commercial production on the Atherton Tableland but other diseases and plant characteristics are a problem. Whatever the long-term aims, there is a need to utilize modern thinking and technology to the full.

Interstate and intra-State meetings of plant breeders have been held in the last year with this in view. Such co-operation enables a pooling of ideas as well as a pooling of breeding material and lends more shoulders to the wheel.

RICE AND TEA

In 1899, the Under Secretary of the Department of Agriculture reported: "Hitherto, rice has been in the experimental stage, has been grown in many parts of the colony, and has fluctuated in area as success or non-success has been met with. It is, however, now settling down to be the property of the Northern district . . . Queensland at present produces 14% of its annual consumption, the statistics being production 1,318,176 lb. of clean rice and the imports 8,235,564 lb. The principal district for rice is that of Cairns, which produced 82% of the total yield, 708 acres being cropped".

The hopeful outlook for rice at that time was not realised, as production steadily declined. There was a brief revival of interest in 1917 due to wartime shortages and a similar revival after World War 2, plantings of up to 70 acres being recorded in the late forties and early fifties.

In 1953, after fairly extensive trials in the north, the Department reported that, if swamp types of rice could be grown under irrigation on soils with a high moisture-retaining capacity, and milling facilities were established within easy reach, the production of rice could be a much more attractive proposition than upland rice growing appeared to be. It was remarked that large areas of suitable soils occur in the Lower Burdekin.

Research in rice growing was begun on the Department's Millaroo Research Station on the Burdekin, primarily for the amelioration of physical conditions in certain soil types. Yields were promising and the results were quickly taken up by district irrigation farmers. After trial farm plantings had confirmed the promise shown on the research station, growers moved quickly to increase acreage, establish milling facilities locally, and make arrangements for the marketing of the crop.

Expectations for the first commercial crop this year are for a total yield of some 360 tons of rice for delivery to two small mills, and growers have made an arrangement with an experienced southern rice marketing organisation to market the processed rice in North Queensland.

Though it was one of the earliest crops introduced to Queensland, tea has never become fully established as a commercial crop.

Present prospects, however, appear to be reasonably bright, with a plantation at the semi-commercial stage and new plantings on a large scale under way.

The current phase of interest goes back some 32 years to the first experimental planting at the Department's Tropical Agriculture Research Station at South Johnstone. Experimental tea gardens and hedge plantings established by the Department since then have produced tea of good quality but even with partly mechanised harvesting cost of production has been too high.

Dr. A. P. Maruff of Nerada has taken the matter further with a large planting and fully mechanised harvesting. Economical processing is the next hurdle to be taken.

Stemming from the promise demonstrated in the official and private plantings, special arrangements were made between the Land Administration Commission and private interests for the leasing of land in North Queensland for tea production, with provision for the building of a local factory.

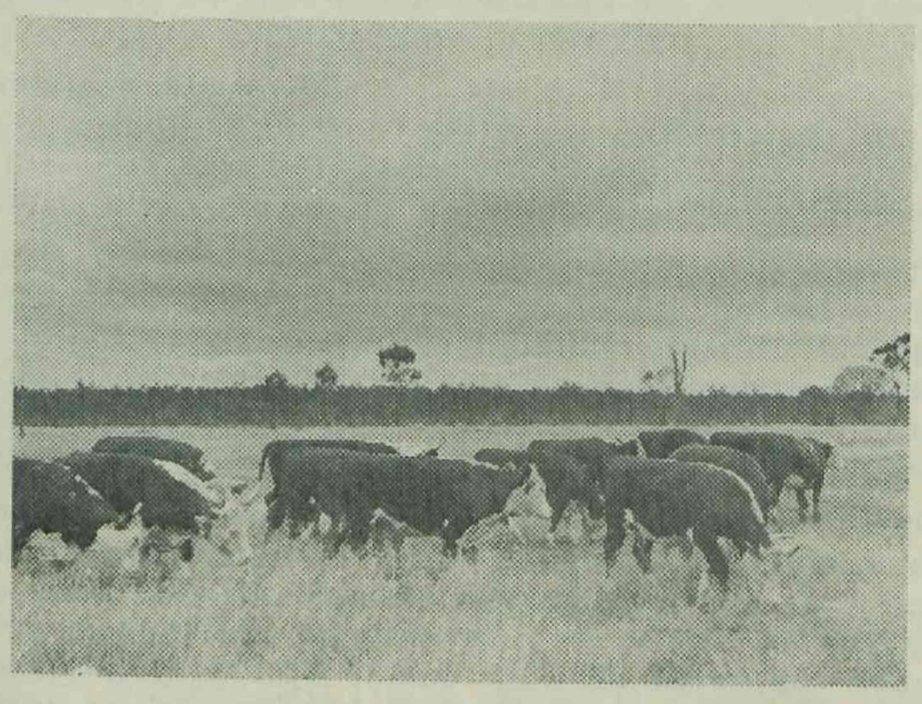
It can be said that rice and tea are entering a new phase in Queensland, with every prospect of adding to the variety of successful crops available to Queensland farmers.

WAR ON WEEDS

The staggering array of weedicides on the shelf of any agricultural chemicals dealer is in sharp contrast to the cans of arsenicals and chlorates that constituted the sole stock-in-trade up until the 1940s.

The use of kerosene as a selective weedkiller in wartime carrot crops gave a pointer to the future, but it was not until the selective hormone weedicides were demonstrated here shortly after World War 2 that the present era of organic chemicals for weed and tree control was ushered in.

But newcomers into the array of weedicides do not establish themselves overnight. Each has to be tested for its usefulness for different purposes under varying soil and climatic conditions. In many cases a selective weedkiller proved effective against, say, wild turnip in wheat in the U.S.A. can be expected to be effective against wild turnip in wheat here. But how useful is it against wild tobacco in the wet tropics of Queensland? And if applied to a weed-infested pasture containing tropical legumes, how will the legumes fare?



Brigalow forest destroyed by herbicides has given way to pastures such as this.

These and a hundred other questions related to the use of herbicides in situations ranging from the home garden to dense brigalow forests are continuously under investigation by Departmental officers.

The study of control of weeds—"plants out of place"—goes far beyond the routine testing of herbicides.

In many cases it involves studies of the physiology of growth and reproduction of pest plants so that the most effective approach to control may be devised.

Where pasture deterioration due to invasion of unwanted plants is concerned, the answer to the problem is often to be found in pasture management.

Here again plant physiological studies and close examination of the environmental conditions under which weeds establish and spread are a prerequisite to the elaboration of control measures.

Biological control of pest plants, as demonstrated with prickly pear over 30 years ago, is perhaps the most desired target, but it is seldom achieved.

Success against only one of the important weeds for which the Department of Lands is actively seeking biological control measures would be of immense benefit to the State.

Though the war on weeds being waged by the Department of Primary Industries and other organisations is a never-ending one, farmers and graziers are immeasurably better equipped to deal with weeds than they were 20 years ago.

The Department can claim to have played a big part in this development.

PESTICIDE RESIDUES

The matter of pesticide residues in foodstuffs intended for human consumption and in tobacco has been assuming considerable importance as various countries have imposed nil or low tolerance levels for various substances.

An early result of the tightening up of restrictions on pesticide residues was the banning in Queensland of the use of DDT in medicaments for cattle tick control. More recently, steps have been taken to ban the use of DDT on pastures throughout Australia.

There is a good deal of co-operative effort throughout the world in the study of pesticide residues. The Department is playing its part in this study. The Animal Research Institute and the Otto Madsen Dairy Research Laboratory, for example, are investigating residues in milk and milk products, as well as beef, and the Agricultural Chemical Laboratory is a member of a committee set up in England to study the problems created by the chemical instability of the dithio-carbamate fungicides.

The agricultural chemicals industry and the authorities controlling the use of these chemicals are faced with the task of balancing the undisputed usefulness of chemicals for specific purposes in pest and disease control against the deleterious effects of their use on wildlife, soils, applicators and consumers of treated plant and animal products.

It is hoped that the integrated and independent studies in progress throughout the world will resolve much of the confusion and disagreement that now exist in relation to the direct and indirect undesirable effects of agricultural chemicals.

EXTENSION SHOWS RESULTS

There has been a spate of conferences, discussions and comments on the gap between the completion of agricultural research projects and the translation of the results into practice.

This concern with the relatively slow rate of adoption of particular improvements in practices is a good thing.

But it does tend to under-rate the very worthwhile job that extension officers are doing to ensure that useful information is integrated into farming systems as quickly as possible.

It can fairly be claimed, for instance, that the efficient performance of the cotton industry on the Darling Downs has been the result of close co-operation between growers and extension officers.

On the Atherton Tableland, the acceptance of hybrid maize varieties—95% of the 1967 crop area was sown to hybrids—was promoted to a considerable extent by the district extension service,

The Department's extension staff at Bundaberg have assisted farmers to formulate development plans for the 15 wallum blocks opened in the Bundaberg-Maryborough district. Extension officers are also providing advice on property development to selectors in the Fitzroy Basin brigalow area.

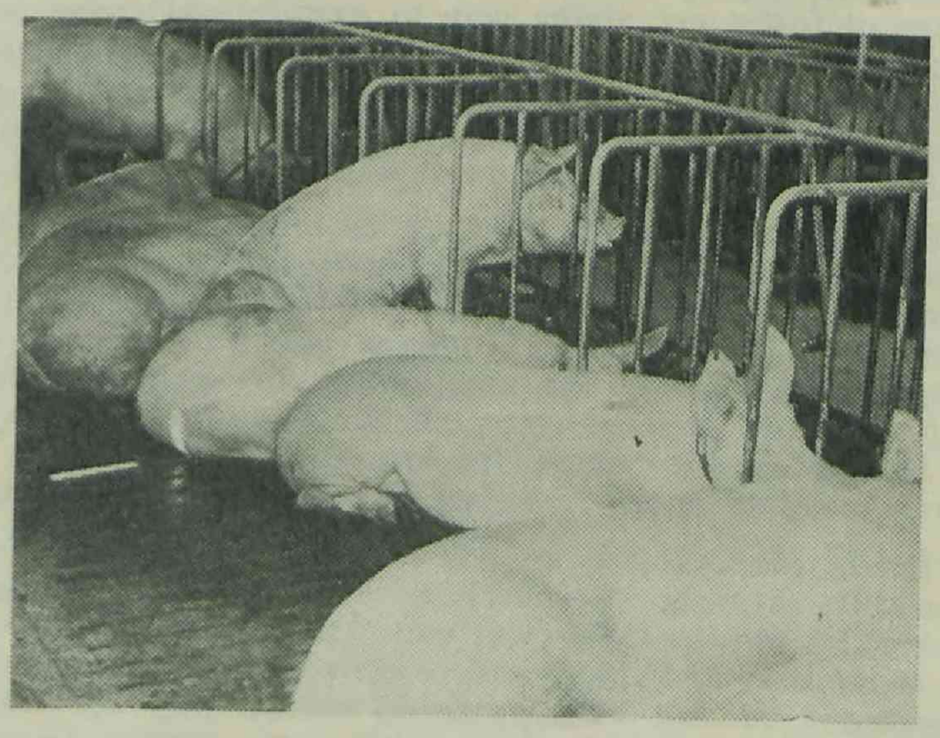
The research worker relies on the extension service to carry his results to producers.

Dairyfarmers in the Near North Coast area have accepted the proposition that their farming system is best based on sown pastures. The area of pasture fertilized in this area rose from 10,000 acres in 1964-65 to over 40,000 acres in 1967-68.

These are some fairly obvious examples of an extension service meeting the needs of producers seeking guidance on farming and grazing operations.

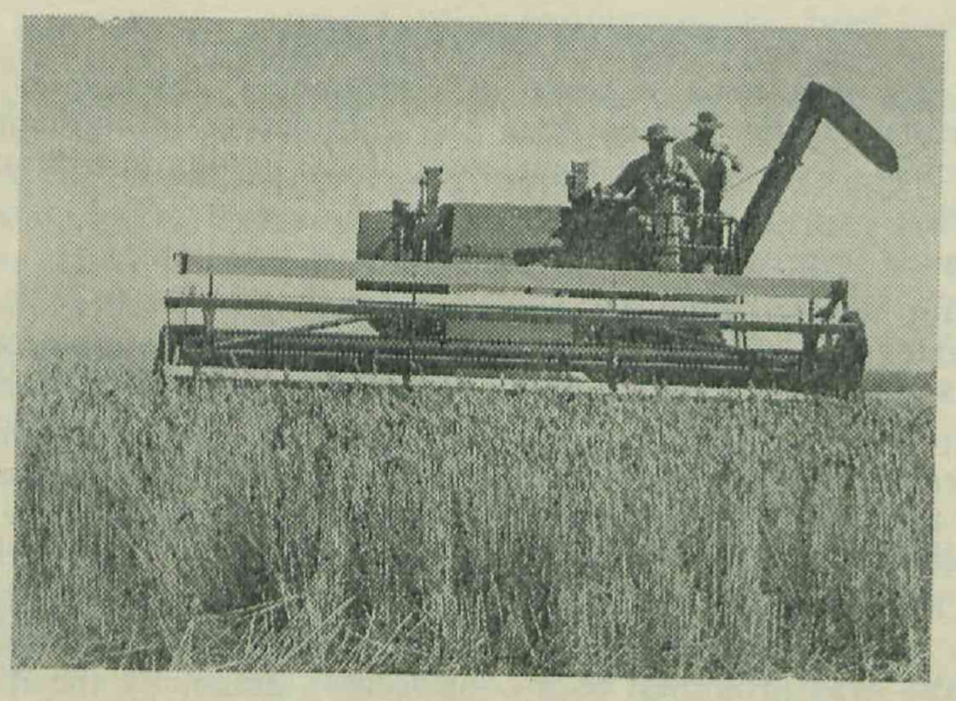
There are other facets of current extension work which indicate that the extension service is geared to the changes which are taking place in the pattern and structure of production.

In response to significant changes in the beef, dairying and pig industries, for instance, steps have been taken to introduce programme planning concepts to officers concerned with servicing these industries so that they may make the continuous analysis necessary in constantly changing circumstances.



Pig raising is becoming highly intensive, requiring a new approach by extension workers.

Following an extension seminar for senior field officers working in the Darling Downs/Maranoa area, existing district extension committees strengthened their operations and additional district committees were established voluntarily by seminar participants. Arrangements have been made for similar seminars to be held for officers of other regions. Reorientation and strengthening of district extension activities are sure to flow from these seminars as they have from the first.



The extension service has played a big part in the expansion of grain growing in traditionally pastoral areas.

The Department's extension service is deeply involved in promoting and furthering extension through producer groups and in guiding farm management demonstrations.

Expansion of regional research is feeding more and more information into the hands of extension officers. The new outlook that is developing in the extension service will ensure that information flows into farm practice at a faster rate than has been possible in the past.

FAUNA STUDIES

The formula

$$Y = 0{\cdot}02388\ \text{M.I.} - 0{\cdot}02335\ \text{B.L.}$$

may have no meaning to the grazier, the kangaroo shooter, the family with a pet dog or the ardent "hands-off-our-wildlife" layman.

Yet it is one of the tools being used to determine the point at which a reconciliation can be effected among the grazing pressure of kangaroos on pastures, the commercial harvesting and use of these animals, and the conservation of this unique form of wildlife.

The formula relates to sex determination of kangaroo skulls and is one of the measuring sticks which have emerged from 10 years of research on kangaroos conducted from the Department's wildlife research centre near Warwick.

Extensive studies of kangaroos in the field and in captivity have been carried out. The habits of the main species have been examined in detail and criteria for determining the effects of drought and harvesting are being developed.

The Department's second wild life research centre, at Townsville, is concerned largely with the balance between conservation and utilisation of game birds such as the various wild ducks. Migration, breeding and feeding habits are being studied in detail.

In a developing State such as Queensland, where millions of acres of forest are giving way to pasture and crops, where the geographical limits of cropping are being widely extended, where man-made water storages are growing in surface area, and where urban development is pushing outwards into the countryside, the environment for wildlife is in a state of flux.

Departmental wildlife research embraces studies of wildlife in relation to this changing environment. It is aimed at answering such questions as the types and extent of country that should be set aside as wildlife preserves, how landholders can encourage colonisation of desirable animals and birds, how surface water, shelter and food sources can best be deployed to serve the needs of conservation, how natural breeding areas can be retained, and so on.

Fauna surveys are an integral and important part of the wildlife services. Comprehensive lists of birds, mammals and reptiles in the Warwick and Townsville districts have been compiled and published. A senior investigator was granted a Churchill Fellowship to enable him to work in wildlife and zoological centres overseas. One outcome of his visit is the preparation of an authoritative list of the birds of North Queensland for use by scientists and naturalists.

While the native fauna are the main concern of the Department's wildlife investigators, some attention has been given to the crocodile population with a view to assessing the need for controlled harvesting in the interests of both professional crocodile hunters and tourists.

The various wildlife conservation societies and their supporters are to be commended for their interest in preserving the native animals with which the State is so richly but not always stably endowed.

Conservation is the Department's objective also. The investigational work briefly outlined here is a continuous project designed to obtain basic information on the relationship between wildlife and its environment and to apply this information to short-term and long-term situations to the best advantage.

OPPORTUNITIES FOR STAFF

With its extremely wide range of professional and technical positions, the Department can offer its staff excellent opportunities for professional improvement.

Youths recruited as cadets at Senior public examination level are required to undertake advanced studies leading to certificates, diplomas and degrees. Special provision has been made for a correspondence course for field cadets.

There is a variety of scholarships available for full-time University attendance in a range of Faculties, including Agricultural Science, Veterinary Science, Science and Economics. Some scholarships are extended to cover an honours year. Some scholarships are also available for the Queensland Agricultural College Associate courses.

Opportunities for full-time post-graduate study both in Australia and overseas arise from time to time. During the past year, for instance, a seeds specialist has been doing an extended course at the University of Adelaide, a veterinarian has completed the Diploma in Animal Health course at the Royal Veterinary College in London and an agrostologist has undertaken an Honours course in physiology of pasture seeds at the University of Queensland.

Some officers also undertake extra-mural work leading to doctorates.

Each year, a number of officers are sent to short courses and on study tours. Overseas study tours for which provision was made during the past year were concerned with cotton breeding in the United States, pasture pests in New Zealand, animal reproduction and artificial insemination in several countries and plant virus disease control.

Interstate study visits covered such subjects as irrigated agriculture, fruit production, plant pathology, food science, radioisotopes in research, veterinary matters, sheep and wool production, turkey growing, agricultural economics, soil conservation and pasture research.

Some officers make their own arrangements for extended periods of study overseas. If the study programme fits the requirements of this Department, study leave is usually granted. In the past year a plant breeder was granted leave to undertake three years' post-graduate training leading to a Ph.D. degree at the University of Minnesota.

AIDING DEVELOPING COUNTRIES

Queensland, as an advanced area in agricultural and pastoral research and its application in the subtropics and tropics, has much to offer many of the developing countries.

The Department is continuously giving assistance to these countries, mainly by providing training facilities for visiting technical officers. This is the most convenient way in which to meet the needs, as it is not practicable for the Department to release officers for long-term assignments overseas. However, short visits are made overseas from time to time to satisfy specific requests.

Individual visitors study in Departmental laboratories and field centres for periods ranging from a few days to several months. Foreign students who have been attached to the Department during the past year were concerned with such subjects as artificial insemination techniques, marketing of dairy products, beef cattle management, food preservation, tropical crops, dairy farming, poultry production and pig raising.

The Department is also a major participant in group training courses for Afro-Asian students. Those held during the past year were on grain storage and extension methods. These group courses run for several months and training in considerable depth is provided for about 20 students in each group. The biennial tropical pasture group course, which is conducted mainly in Queensland, is a popular one with overseas students.

Livestock Research and Extension

BEEF CATTLE

A number of observations are being made in northern, central and southern Queensland into breeding performance in beef cattle. These range from pregnancy diagnosis following the seasonal mating period to detailed observations at regular intervals throughout the year, in which the effect and interaction of age, lactation status, time of calving, fluctuations in weight and condition, and bull fertility on pregnancy rate, calving interval and weaning percentage are being assessed.

Weaners in the herd management trials at Brian Pastures Pasture Research Station.

These studies have three primary objectives. In the first instance, the simpler observations are undertaken to obtain reliable statistical information on breeding performance. More comprehensive trials relate the factors mentioned above to variations in management techniques such as overmating (i.e. mating more breeders than required and culling those non-pregnant), strategic weaning, and the use of pregnancy diagnosis as a management aid.

In an investigation of the effects of seasonal mating time and other factors on the reproductive performance of breeders and the growth rates of progeny, in north Queensland conception rates were similar for the five mating times used. However, the conception rate of dry cows was higher than for lactating animals and cows which gained most weight during the mating period had the highest conception rate. Mortalities ranging from 3% to 16% occurred in all breeder groups, deaths occurring mainly when the final 3 months of pregnancy coincided with a period of nutritional stress. These findings, which are consistent with the results of other observations, have important implications for breeder management in commercial herds.

A programme of artificial insemination in the beef herd at Swan's Lagoon Cattle Field Research Station is designed to test and develop techniques for using artificial insemination in large beef breeding herds and to test the effectiveness of the procedure for disease control under these conditions.

Techniques being studied include injections of hormones to synchronise the onset of oestrus for a group of cows so that they are ready for insemination at the same time. When perfected, this technique will be an important advance over insemination on natural oestrus for beef herds.

Results of pregnancy testing indicate that satisfactory conception rates are being obtained with the artificial breeding programme.

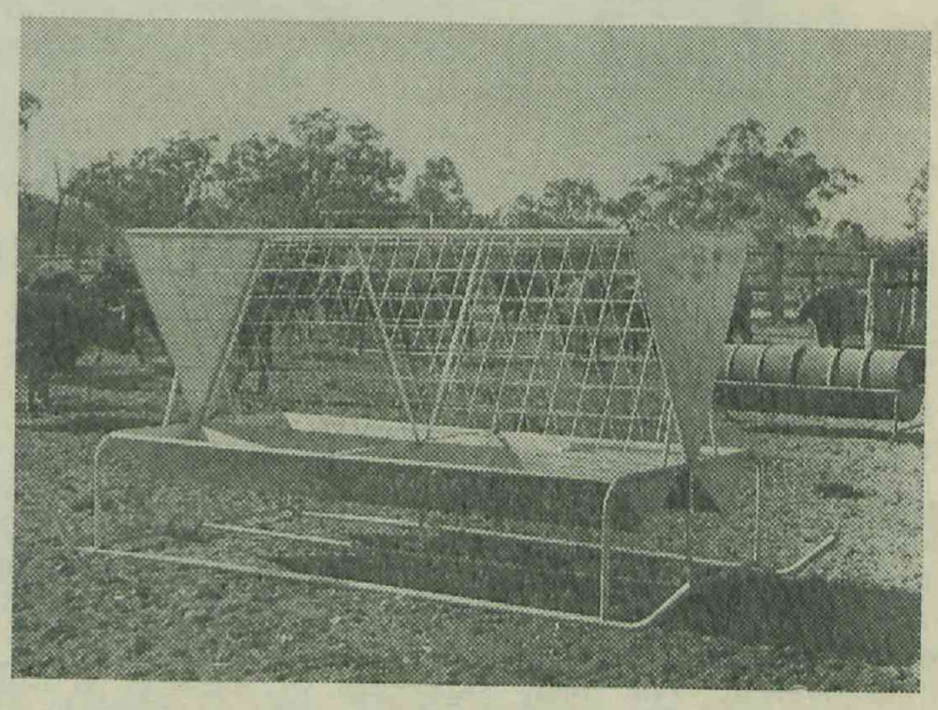
A comprehensive trial on the Burdekin is designed to investigate a two-paddock rotation as a means of tick control, a system of strategic dipping for tick control, and a pasture management system designed to build up the Townsville lucerne component in the pasture while including rotational herd management for tick control. Variations in cattle tick population and live-weight performance of the experimental animals will be studied.

Studies at Ayr Cattle Field Research Station, covering the production and utilisation of the major crops with a potential for beef production, are providing basic data essential for any development planning for the primary industries of north Queensland. It has become evident that in any irrigation programme there is a need to introduce a pasture phase into the crop rotation.

In a digestibility study with sweet sorghum (Zulu), it was found that the observed decline in cattle performance with advancing crop maturity was associated with a decline in crude protein content and digestibility after the 60-day stage of growth. Digestibility was increased by the addition of a molasses-urea supplement.

Studies of a range of molasses-water-urea mixtures have indicated the lick composition required for a given level of intake. They have also demonstrated the safety of feeding through rotary lickers, even at urea intake levels in excess of 16 oz. per head daily. This supplementation procedure has been widely adopted by the industry.

Studies of the intensive production of beef from rations containing a high percentage of grain have continued at the Husbandry Research Farm, Rocklea. It now appears that the major nutritional factors in this form of beef production have been defined. Currently, further studies are in progress to investigate the sodium requirements of cattle fed high-grain rations and the observed increased efficiency of conversion of feed to carcass weight gain that occurs when sorghum grain is finely ground.



Racks and drums rollers at Swans Lagoon Cattle Field Research Station permit the use of dry and liquid feed supplements.

As approximately 11 lb. of a high-grain ration are required per pound carcass weight gain, this system of beef production is not economically viable where the ratio of feed to carcass prices is wider than 1:11. Results collected from 406 18-month-old steers finished on high-grain rations showed that a mean of 62% of the body-weight gain was recovered as gain in carcass weight. This gain in carcass weight averaged 72% saleable cuts of meat, 20% fat trimmings and 8% bone.

Experiments have continued on nutritional aspects of the survival feeding of cattle during drought. Recent unpublished experiments elsewhere have shown that survival feeding is essentially a problem of adjusting the rate of utilization of body reserves in accordance with the length of the period of survival feeding. Survival in a drought therefore depends on body reserves at the commencement of the drought. In an experiment at the Husbandry Research Farm, Rocklea, steers of high initial body condition survived approximately 50% longer than comparable steers on low initial body condition when both were fed the same drought ration.

Further studies on the effect of post-natal nutrition of the calf on its subsequent performance have supported earlier experiments. These experiments had indicated that calves kept on a low plane of nutrition for the first 200 days post-natal were unable to make compensatory body weight gains and their skeletal growth was reduced.

A 4-year trial in which the protein concentration of the diet of grazing cattle was maintained at a predetermined level indicated that knowledge of the quality of the grazed diet is of little value in predicting production responses to supplementary feeding except when the dietary protein concentration is very low or very high.

The effect of copper and cobalt therapy on liver copper storage was determined in cattle grazing a Lotononis/Pangola pasture on a former wet heath area. Untreated animals became deficient in copper; copper therapy maintained adequate liver copper levels; cobalt therapy reduced liver copper levels. Therapy gave no significant productivity response in fattening steers over an 18-month period.

Further studies on pesticide residues induced by the use of "backrubbers" for buffalo-fly control have demonstrated the influence of the carrier oil used to impregnate these devices. DDT carried in SAE 30 or SAE 50 induced acceptable residues while the same pesticide in dieselene yielded very high residues during a 3-month trial period.

As the eradication of contagious bovine pleuropneumonia proceeds, the few remaining foci of the disease are in North Queensland and the laboratory work is now centred at the Animal Health Station, Oonoonba. All of the lungs with pneumonic lesions and pleurisy are examined and 24,000 sera have been tested by the complement fixation test for evidence of the disease.

Mobile spraying unit designed by the Department for use in the resistant cattle tick control programme.

Despite the progress that has been made with tick fever research projects, much remains to be done on the prevention of sickness and death of cattle from the disease. This has led to studies of the immunity of cattle and methods of enhancing it, and also of the virulence of the parasites that cause the disease. Various ways of changing virulence have been discovered. The most important of these is to infect in rapid succession a series of calves which have had their spleens removed. After this has been done about 10 times, parasites which originally were capable of causing death produce relatively mild infections and can be used safely in vaccine. In view of the increasing interest in and need to reduce tick numbers to a minimum, methods of keeping tick fever immunity high by vaccination alone are being studied. Work completed indicates that it is advisable to use a different strain of parasite when cattle are to be re-vaccinated. If this is done it may not be necessary to re-vaccinate as frequently as presently recommended.

Other work in progress includes testing of promising drugs against tick fever and anaplasmosis, a study of tick fever in deer and even better standardisation of the tick fever vaccine. One preparation under investigation has been found to be remarkably effective for treatment, for prevention of infection and for the termination of the carrier state in animals with tick fever. This offers a number of possible uses provided the price is reasonable and more extensive testing confirms that there are no toxic effects.

Low temperature preservation of babesia is being studied and it appears that strains can be maintained indefinitely. This enables standardised challenge infections to be done in experiments carried out at different times.

The testing of cattle ticks for resistance has been expanded.

A long-term experiment on the immunity of cattle to tick fever using vaccination compared with moderate natural tick infestation is being carried out at the Animal Health Station, Oonoonba.

Over 1,000,000 doses of tick fever vaccine developed as a direct result of research performed at the Department's Animal Research Institute were distributed from the Wacol Tick Fever Research Centre. South-east Asian countries are showing interest in the vaccine and several consignments have been used in other countries. Much of the vaccine (201,700 doses) has been supplied free for use in cattle which are undergoing a compulsory dipping programme because of resistant ticks.

To the end of June, ticks from properties of 183 owners had been shown to possess Biarra-type resistance, as follows: Beaudesert 9, Beenleigh 7, Biarra 99, Blackbutt 1, Boonah 5, Brookfield 1, Bundaberg 1, Caboolture 5, Coomera 1, Crows Nest 8, Dayboro 3, Kallangur 1, Kilcoy 18, Laidley 1, Mackay 8, Mooloolah 1, Mt. Stanley 1, Mudgeeraba 1, Mundubbera 1, Nambour 10 and Oxenford 1.

The conditions imposed on movements from quarantined holdings were further considered at meetings of the Working Party set up by the Parliamentary Joint Committee and amended to provide alternative programmes for owners on holdings adjoining resistant properties.

Dursban and Nexagan continued to give good control of resistant ticks. A mobile spray plant built to a Departmental design has been put into operation to hasten treatment and ease the physical burden on staff.

SHEEP AND WOOL

In the nucleus joining and lambing trial at Toorak Sheep Field Research Station, a third spring joining was made. Data from spring joinings over three years show that there is a big difference between the percentage of ewes showing oestrus (as determined by teasers) and the percentage of ewes actually served. This drop does not occur with autumn joinings, suggesting that the length of oestrus would be worth investigating.

A trial has begun on the effects of modifying the level of nutrition during the first and second year of life on reproduction patterns in Merino ewes. Another trial is concerned with the reproductive performance of ewes fed on different planes of nutrition for 3 months before joining.

The vitamin A status of weaner wethers pastured on open Mitchell grass downs country is being examined.

The influence of the plane of nutrition on urea intoxication has been investigated. The protective action of a high plane of nutrition has been demonstrated to act through enhanced liver detoxification of ammonia and not through the action of rumen microflora.

The infestation of sheep by spear grass seed and the persistence of seed in skin and body tissues are being studied. After 18 months following removal to pasture free from spear grasses, a significant amount of seed remained in both skin samples and carcasses, more seed of black spear grass (*Heteropogon contortus*) than of white spear grass (*Aristida* spp.) being detected.

In an endeavour to ascertain the cause of humpyback in sheep, penned sheep were fed on a suspect plant, quena (*Solanum esuriale*). Symptoms indicative of the humpyback syndrome were observed on exercise after eating seeds alone and lucerne chaff plus berries.

A number of strains of sheep blowflies have been tested for resistance to organophosphorus compounds and some degree of resistance to diazinon was found in two strains. This is an indication that in the future more attention may have to be given to methods of fly control and less dependence placed on insecticides.

A mating experiment is being conducted to determine if the muscle lesions present in a limited number of sheep flocks in south-east Queensland is hereditary.

A total of 4,285 wool samples, half from commercial properties, was received at the Wool Biology Laboratory for examination. Thirty-four properties participated, the objective being to obtain data on percentage yield of scoured wool and fibre characteristics as an aid to breeding programmes.

PIGS

An investigation into the comparative value of wheat, sorghum and barley as the grain component in pig rations has shown that Queensland wheat is markedly superior to sorghum and barley. However, the nutritional value of sorghum and barley in pig rations appears to be similar. The superiority of wheat is illustrated by the observation that rations based on wheat required only 15% meat-and-bone meal supplement to produce comparable rate of gain as a 20% meat-and-bone meal sorghum-based ration.

In three experiments using sorghum grain varying from 6·5 to 13·3% crude protein, it has been shown that with normal levels of protein supplementation the protein content of the sorghum has no significant effect on growth rate or feed efficiency of growing pigs. However, the higher protein grain tended to produce a leaner carcass.

A computer programme has been developed for formulating least-cost rations. Some of the computed rations have been tested at the Research Stations and even in some cases where feed efficiency has been reduced they have proved to be the most economical per unit of body-weight gain. Trials have shown that up to 66% of a ration of wheat + 15% soybean meal can be replaced by pollard on a 1:1·23 basis.

Heavy condemnations resulted in pigs from the Toowoomba area last year when tuberculosis-like lesions were detected in carcasses at slaughter. Further examination of the lesions has shown that they are caused by Battey strain, serotype VI mycobacteria. Similar organisms which have not yet been completely characterized have been recovered from lesions from nine additional properties and 12 others are suspected on pathological grounds. All of these are located in southern Queensland from Crows Nest to Wallumbilla.

There is no evidence that the infection causes clinical disease in pigs and on most properties it appears to be self-limiting. Continuing infection has beeen occurring only on a small number of the properties.

Close co-operation is being maintained with the Health Department in view of possible human health implications and a survey of pigs from various areas of the State has been undertaken to assess the incidence of the infection.

POULTRY

Experiments were conducted to evaluate molasses as a ration ingredient for both broiler chickens and layers. Growing birds performed satisfactorily when levels of molasses as high as 20% were included in a practical broiler starter ration at the expense of the grain component. Broiler rations containing molasses which had been stored for 4 months under farm conditions showed no decline in quality as measured by bird performance. Rations containing up to 12% molasses fed to laying birds proved to be at least equal to a control ration not containing molasses in supporting good egg production.

Further experiments during the year examined the calcium, manganese and choline requirements of broilers. Sex and strain differences in calcium requirements were established and it was found that the choline content of a ration influences the bird's manganese requirement.

Rations of differing protein percentages fed to birds of a layer strain during their growing and laying periods were examined in an experiment conducted for a full production year. The results suggest that lowering the protein level of a diet fed free choice is a suitable method for retarding growth and delaying the sexual maturity of replacement pullets. It also appears that this practice may favourably influence the albumen quality of eggs subsequently produced.

Genetical and nutritional experiments have commenced to investigate the problem of leg weakness of broiler chickens which is causing economic loss to the poultry industry. This trouble is often associated with encephalomyelitis and some degree of rickets. Analysis of bones for density, moisture, ash, citrate, calcium, phosphorus, magnesium and alkaline phosphatose indicated no difference in these parameters between normal and bent bones which appeared osteoporotic.

Three experiments on efficiency of vaccination against infectious bronchitis have given conflicting results. Vaccination in the drinking water as recommended at 4 days and 4 weeks has not always given protection to challenge with a recently isolated field strain of virus at 10 weeks of age. Serological response following vaccination and the effect of material antibodies on effectiveness of vaccination are being studied.

Field observation of early chick mortality has indicated that a fair percentage of early chick deaths on some farms are directly or indirectly the result of poor brooding technique. Temperature readings taken under brooders on several broiler farms at Maryborough during the winter months demonstrated quite clearly the inadequacies of some brooding systems in that area. It is expected that the investigation in the Brisbane area will produce similar results.

During 1967 a field study of the operation of a controlled environment broiler house has been carried out on the property of a co-operating broiler grower at Capalaba. Of the four batches of broilers raised in the shed in 1967, only one returned a higher net profit per bird than that obtained in the conventional shedding. When the whole year's operation is considered, the return on capital invested was less in the controlled environment shed than in the conventional shed.

Apart from the economic considerations, much valuable information has been obtained about the operation of controlled environment broiler housing in a subtropical climate. It has been established that ventilation requirements of poultry in such housing in this climate are greater than the recommended ventilation rates in cooler climates in other States and overseas.

The results of this study have indicated that the improvement gained in feed conversion efficiency in the controlled environment shed is mainly due to the control of light levels. At the very low light intensity used in this shed (0·1–0·3 foot-candles), the birds are greatly subdued and are disinclined to move about other than to eat and drink.

The 10th Random Sample Layer Trial which commenced on July 18, 1966, concluded on November 13, 1967, occupying a period of 462 days. Eleven entries were accepted. Mortality figures were 10% from the day-old to 17 weeks period and 22% from the 17 weeks to 66-week period. These figures, although above some of the previous Random Sample results, were consistent with field reports. Leucosis, particularly

Part of a flock of 15,000 young chickens in the hot air brooding section of a broiler shed. The Department is investigating brooding techniques.

the Marke's disease syndrome, was again the major cause of death, accounting for 80% of the losses. A bird of 4½–5 lb. weight averaging 200 eggs on a hen-day basis was typical of this year's entrants. The competition was keen and only slight variations in some aspects were sufficient to determine the final placings.

A survey was commenced of the changing structure of the poultry industry in south-eastern Queensland. Preliminary results show that the industry is moving nearer to the source of supply of grains, the Darling Downs.

MEAT INSPECTION

Full-time inspection was carried out at all major establishments and part-time at smaller ones.

Septicaemic conditions in pigs, many associated with arthritis, remain a major cause of economic loss to the pig industry. Once again, tuberculosis was a heavy source of loss to owners of herds in which the disease is endemic.

When Dinmore Meatworks and the Bremer River Abattoir gained access to local trade in Brisbane and Ipswich, they elected to undertake grading. A substantial proportion of the beef produced at meatworks in Brisbane, Ipswich, Toowoomba and Townsville is now graded voluntarily.

"The Pet Food Regulations of 1967" were gazetted during the year. Numerous pet food preparation shops, pet food selling shops and kangaroo depots were registered.

Licensed poultry slaughter houses decreased by 10 to 135. The multiple slaughterhouse system is not conducive to adequate inspection and reduction in numbers will lead to improvement of standards at the fewer but larger works.

Dairy Research and Extension

ARTIFICIAL INSEMINATION

A new phase of bull-proving operations was introduced during the year when sons of proven sires, the result of contract matings in stud herds, were used in both the Jersey and the A.I.S. bull proving areas. It is intended that proving in these areas be confined from now on to the progeny of proven sires, using as an occasional introduction the son of a southern proven sire as a check against inbreeding and the general standard of sires.

The Friesian scheme has developed to the stage at which daughters of the first bulls used are lactating, and a preliminary assessment should be available shortly.

The pattern of artificial insemination usage in dairying areas is referred to elsewhere in this report.

The matter of efficiency of A.I. technicians continues to be kept under constant review, with particular attention being paid to newly trained personnel by way of field supervision. First service non-return performance, on a 60-90 day basis, now averages 69·4%. Wide variation in efficiency between technicians still occurs.

CROSSBREEDING

Performance of first cross animals in previous years of the dairy crossbreeding programme has been disappointing, with difficult temperament inherited from the Sahiwal parent interfering with efficient milking shed routine. However, a marked improvement is evident in the current lactation, with animals commencing lactation at a satisfactory level—in excess of 4 gallons per day. Persistency of lactation has also shown a marked improvement. Second generation heifers, bred from the more productive first cross animals, will be mated during the coming year.

HERD RECORDING

A total of 45,982 cows from 1,044 recorded herds completed lactations during the 1966-67 year. Average milk production per cow was 5,123 lb., containing an average fat content of 4·3% and a total fat of 220 lb. For the first time an average yield of greater than 200 lb. was recorded, the previous highest being 194 lb. in 1965-66.

The Friesian breed is expanding rapidly in areas where wholemilk is marketed.

Group herd recording continued to operate at approximately the same strength of membership, with some variations in particular districts. It is planned to introduce bi-monthly testing to certain areas in the coming year to maintain services in the marginal areas and to establish full groups in other centres.

For the year ended June 30, 1968, a total of 4,866 pure bred cows completed recorded lactations. The distribution of breeds and number of herds was as follows:—

Breed	No. of Herds	No. of Cows	Average Yield lb.		
			Milk	Test %	Fat
A.I.S.	71	1,903	7,403	4·1	302
Ayrshire	6	146	6,872	4·2	289
Friesian	21	510	7,522	3·6	273
Guernsey	16	523	5,920	4·6	271
Jersey	57	1,784	5,904	5·1	301
TOTAL	171	4,866	6,690	4·4	295

During the year the Committee of the Stock Breeders Association voted in favour of extending the official lactation period from 270 days to 300 days, thus bringing the period in agreement with the Group Scheme in the State and with the Group and Pure Bred schemes in other States.

A total 431 cows successfully attained the production standards for the Register of Merit as follows: 33 Elite, 153 Lifetime, 245 Immediate.

Continuation of sire survey studies was programmed on the computer, 948 bulls with six or more daughters recorded in 1967-68 being analysed.

Analyses of production records to establish the suitability of bi-monthly testing and recording for the first three months as a prediction of total lactation production and ranking of cows were undertaken during the year.

Comparing bi-monthly results with monthly production for ranking cows within herds it was established using 4,505 records that in 99% of herds the rank order correlation was 0·9 or greater. A total of 2,611 lactations was examined to determine the percentage difference in total yield between the two recordings. The average percentage difference fell from 10·1 for lactations of less than 240 days to 4·5 for lactations of over 300 days. The average for 240-300 days was 5·8.

The interest in the production recording of goats appears to be waning. During the year a total of 25 goats from seven herds was recorded. Average production of milk and fat during the 270 days or less lactation was 1,949 lb. and 60 lb. respectively.

PRODUCTS RESEARCH

Queensland has co-operated with Victoria in carrying out research to find the most satisfactory way of improving the spreadability of butter being marketed primarily for home consumption. Methods of cream treatment are under investigation since it is known that some of these can yield a butter with improved spreadability characteristics. New automatic equipment has been installed in one butter factory to permit the studying of various cream treatment techniques.

The only Continuous Buttermaker in use in Queensland, that installed at the Atherton Tableland Co-operative Butter Association's factory at Malanda, has been used for investigations into techniques of continuous butter-making. Studies on variations in churning conditions, salting methods and rates, together with texturising and determination of spreadability of butters made by the new process, have been undertaken.

Study of the various factors involved in caramelisation of a wide range of natural and reconstituted dairy products has been undertaken and has yielded useful information. Samples of the product have been made available to some importing countries, notably Japan.

Work has continued in the manufacture of non-cheddar varieties of cheese to suit the demands of people requiring a more piquant taste in cheese. Attention has been turned to Quarg (a semi-solid lactic cheese of smooth consistency manufactured from skim-milk), Queso Blanco and Ricotta, and successful batches of these products have been made on an experimental scale.

Attempts have been made to produce beverages from whey, normally a waste by-product, in a manner similar to those manufactured and marketed in Europe. Work so far has yielded a number of products which have a good flavour and can be manufactured without unduly high cost.

Attention has also been given to the development of flavoured drinks from skim-milk, using both natural skim-milk and skim-milk derived by reconstitution of skim-milk powder. Satisfactory products of various types have been produced in both a normal and a concentrated form.

The steep increase in the price of animal rennet for cheesemaking has directed attention to the efficacy of using microbial rennets for the manufacture of cheese. A Japanese commercial microbial rennet product has been tried blended with animal rennet on a 50-50 basis to produce a very good quality cheese.

The widespread adoption of farm refrigeration of milk, coupled with the installation of bulk farm tanks and skip-a-day pick-up, have created conditions which have seriously undermined the efficacy of existing methods for the bacteriological grading of raw farm milk. Consequently the tempo of work carried out to develop a new test or tests for determining quality of such milk has been stepped up. Results to date indicate that a number of ways of approaching the problem may be at least partially successful. These have included the use of pre-incubation techniques for samples and the adoption of a modified catalase test to replace methylene blue.

Investigations have been carried out to determine the effect of homogenisation on tests applied to milk and cream. Tests for bacterial count and keeping quality have been examined.

Because of the insistence by Japanese importers on rigid bacteriological quality standards for cheese—namely that the cheese shall be free from *Escherichia coli* Type I and from coagulase positive staphylococci—the characteristics of the development of coliform organisms in cheese and also the rate of die-out of these organisms have been studied. The results so far show that the die-out pattern tends to follow a linear pattern with some constancy in the gradient. This means that it may be possible to establish a maximum level for these organisms in cheese below which die-out could be expected before the cheese arrives at its destination.

The work carried out on weed tainting in dairy produce has reached the stage of finality. In the case of *Lepidium* taints, 0·5 p.p.m. of skatole and 0·3 p.p.m. of indole were isolated from *Lepidium*-tainted butterfat. Flavour evaluation tests demonstrated that skatole was principally responsible for the flavour defect. In the second part of the work, milk strongly tainted with *Coronopus* has been subjected through protracted plant and laboratory extraction and identification techniques to flavour evaluation experiments. The work demonstrated that benzyl methyl sulphide is a principal contributor to the flavour defect. It appears that benzyl methyl sulphide, which is not present in the tainting plant, is formed through animal metabolism from benzyl thiocyanate which is present. The tainting principle could be formed directly from the last-mentioned compound or through an intermediate metabolite such as benzyl mercaptan.

Work on lipases during the past year has been aimed at preparing purified lipases with a view to comparing them with enzymes present in the cheese itself. A rapid and sensitive assay technique using a pH-stat has been developed and studies with this apparatus have shown that as low as 0·2 units of lipase activity per ml. can be detected.

An intensified programme of work on the composition of milk on the Atherton Tableland has shown that low solids-not-fat levels in milk are due directly to lowering in nutritional status of cattle and particularly where herds have been changed from small to larger breeds. Farm trials have shown success in raising solids-not-fat levels in milk following increases in total digestible nitrogen intake level.

The final series of studies of dilution of cream during processing were completed. There was a definite seasonal pattern with fat losses, the levels in winter being approximately 0·3% higher than in the summer period.

In association with bulk tank equipment suppliers, testing of prototype bulk milk tank units for construction, design and cooling performance continued.

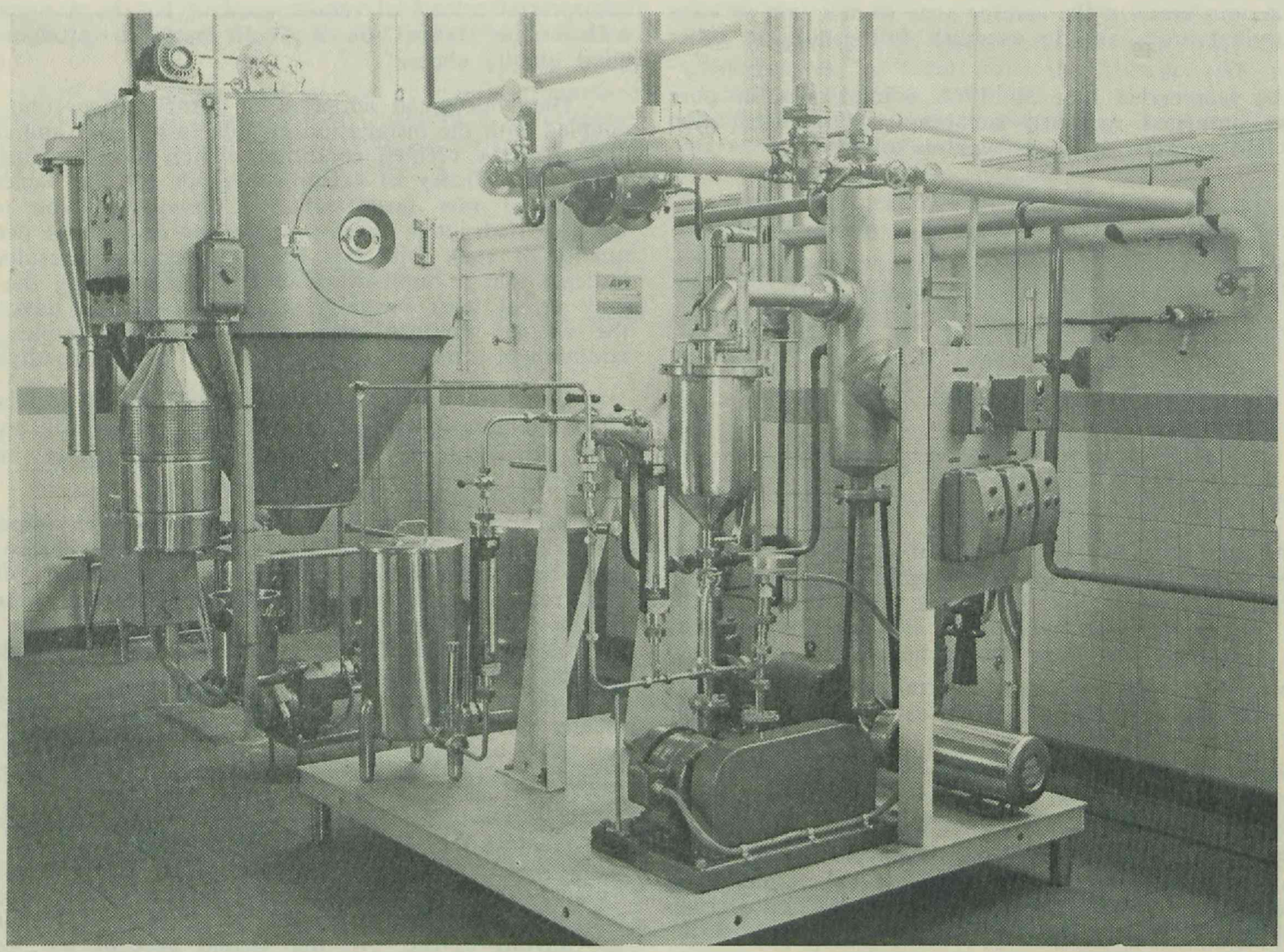
ECONOMICS

A comprehensive investigation into the supply, processing and distribution on milk and other dairy products in southern Queensland was carried out by the Division of Marketing.

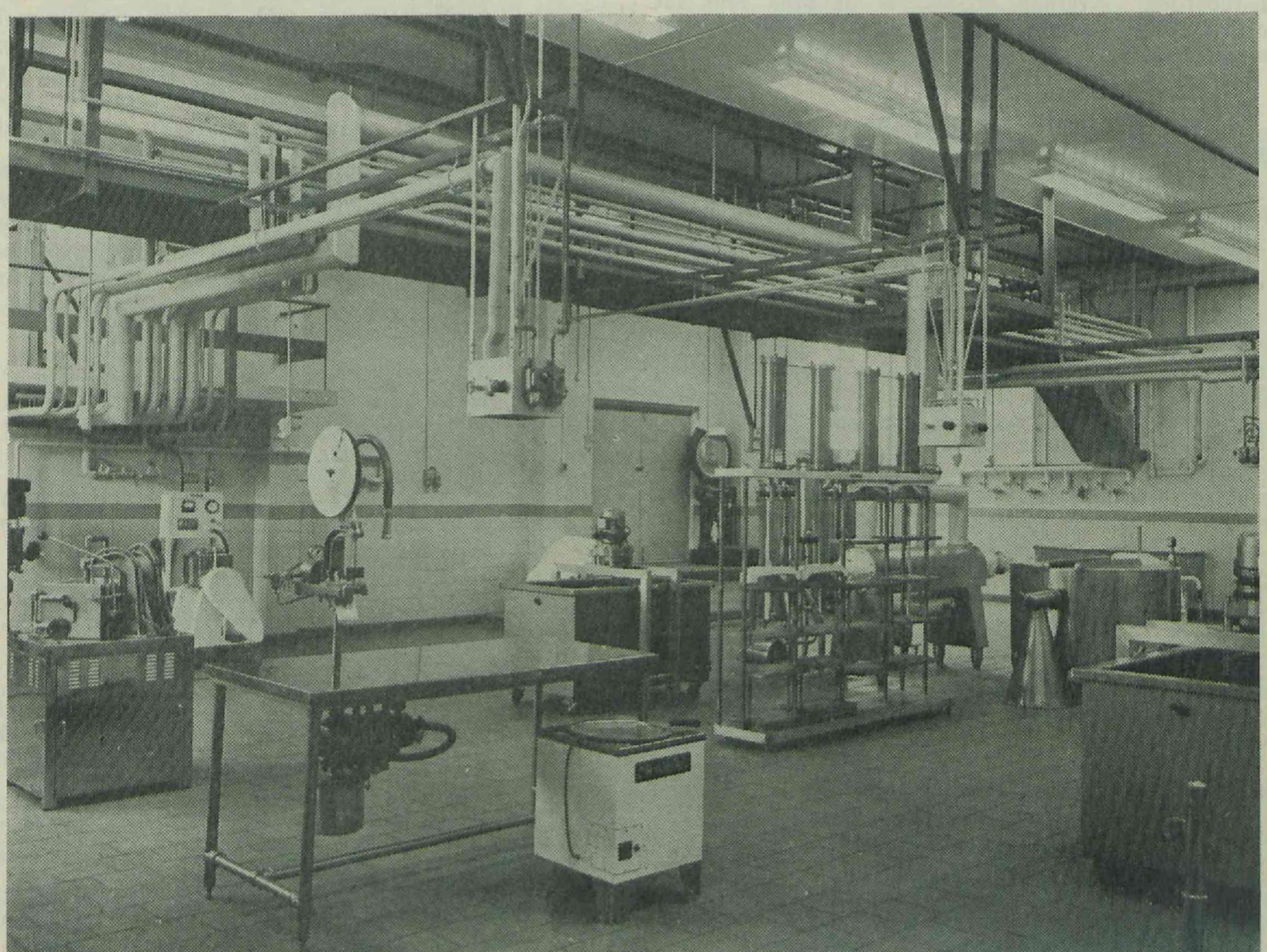
Work commenced on a study of the problems associated with the changeover from cream/pig enterprises to whole-milk supply on dairy farms in southern Queensland.

Work continued with the whole-farm demonstrations in the Ipswich area, which were commenced in 1966. Well attended field days have been conducted on the two properties.

Farm management investigational work was carried out on dairy farms on the Near North Coast to determine maximum stocking rates in terms of improved pasture, irrigation, cropping and the use of nitrogenous fertilizers.



Concentrating and spray-drying equipment in the pilot plant of the Otto Madsen Dairy Research Laboratory.



General view of the pilot plant at the Otto Madsen Dairy Research Laboratory

Pasture Research and Development

RESEARCH

Performance of pasture species is being examined at centres throughout the State.

Among the recent introductions studied at the Charleville pasture nursery, strains of the grasses *Anthephora, Cenchrus, Schmidtia* and *Dactyloctenium* have shown promise.

The Tropical Agriculture Research Station at South Johnstone has 200 legumes and 100 grasses under test. Over 150 *Stylosanthes* introductions are being examined in conjunction with C.S.I.R.O. Two new strains collected by Dr. Grof from Central America compare very favourably with the variety in common use in Queensland.

In the southern border traprock country, rose clover is showing promise, while the yields of annual medics in grassland were doubled when the ground was lightly tilled in spring and autumn.

Green panic and lucerne pasture is being extensively used on the northern Darling Downs.

Hairy Peruvian lucerne has maintained a consistent yield advantage over the Hunter River variety at Hermitage Research Station. This has been particularly evident during winter and spring, when increased production is most important.

Over 100 *Glycine javanica* introductions have been classified according to their botanical characteristics at Kairi Research Station and genotypes are now available to commence a breeding programme aimed at yield improvement.

In spite of greater seedling losses during drought when compared with the larger seeded sorghums, bulrush millets were superior in forage production and quality on the Atherton Tableland. Their tillering capacity, leafiness and freedom from disease make them most attractive forages for this environment.

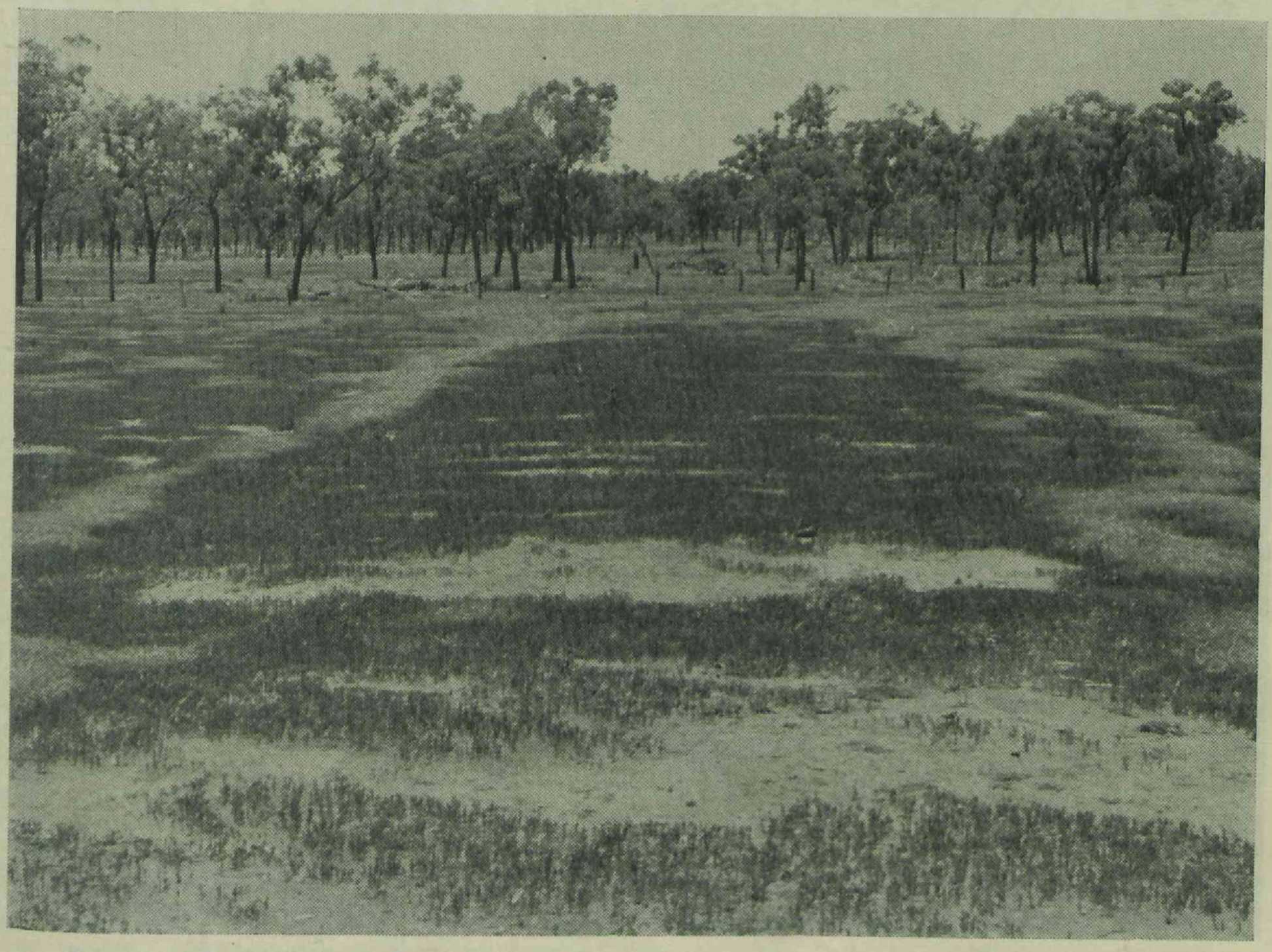
The suitability of pasture grasses for seasonally flooded country in the brigalow areas has been examined in pot trials at Mackay. *Panicum coloratum* varieties showed the greatest tolerance to a period of flooding; Rhodes grass showed some tolerance; and Tarewinnabar and Biloela were the best of the buffel grasses in this respect. In associated field trials, *Urochloa mosambicensis* has been as drought tolerant as the buffels, but in a flooding experiment it was somewhat susceptible.

Notable points from the first 2 years of Townsville lucerne research at Swan's Lagoon station were: (*a*) Townsville lucerne yields have increased over successive seasons and are considerably higher in fertilized areas; (*b*) overall weight changes are related to both fertilizer application and stocking rate, being highest on the fertilized, low stocking rate Townsville lucerne; (*c*) performance on Townsville lucerne with superphosphate at both 1 beast to 3 and 1 beast to 6 acres is superior to that on both unfertilized Townsville lucerne and native pastures; and (*d*) feed supply in the unfertilized Townsville lucerne 1 beast to 3 acres treatment was exhausted in late 1967, but stock were left in the paddocks without mortality.

At the Utchee Creek Sub-station outside South Johnstone four guinea grasses and ruzi grass are being grown with various legumes and tested under the stocking rate of 2 beasts per acre in summer and 1 per acre in winter. Three cattle stocking rates and two fertilizer maintenance treatments are being studied in a tropical pasture on Tully River Station.

In a trial at Blackall on buffel grass pastures developed from gidyea scrub, three sheep stocking pressures are being used to study their effects on soil nutrients and the pasture.

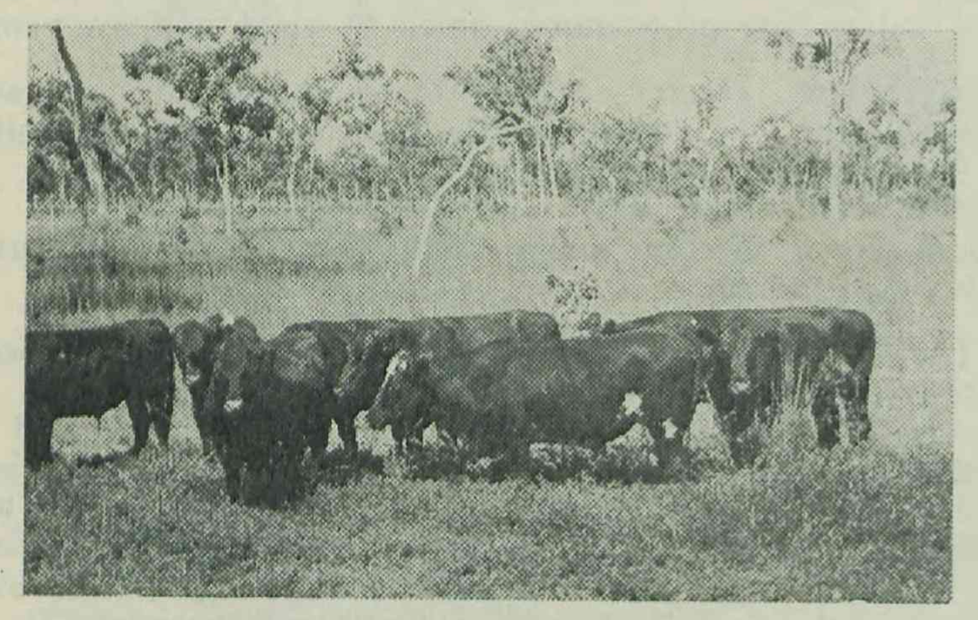
At Norwin, on the Darling Downs, Rhodes grass and three varieties of *Panicum coloratum* with lucerne are being tested as ley pastures under three sheep stocking rates.



Townsville lucerne is being established and encouraged on many beef properties in Cape York Peninsula.

There are also continuous cropping treatments so that the effects of pasture phases on the soil and on subsequent crop yields can be assessed, in addition to the pasture productivity.

In an older trial at Texas, grazing lucerne as a winter supplement to poor quality native grasses provided quality feed at a critical time and arrested body weight decline in sheep.



Steers on Townsville lucerne grazing experiment at Swans Lagoon Cattle Field Research Station.

At "Brian Pastures" Pasture Research Station, near Gayndah, work continued on fine-stem stylo. This legume has shown an outstanding ability to grow on poor granite soils and to increase in density in competition with spear grass. In nutritional studies, yield was increased 38% by the application of sulphur. Growth responses to sulphur dressings in Hunter River lucerne were obtained at Warwick and Nobby, while trials in the Burdekin area indicated responses to applications of copper, zinc and molybdenised superphosphate.

Pastures have responded well to superphosphate, copper and zinc on coastal forest and tea-tree soils of the North Queensland high rainfall zone. The Tropical Agriculture Research Station has now established a sub-station in this class of country at Silkwood and phosphate trials have given interesting results. Calcined Christmas Island phosphate was only 50–65% as effective as superphosphate in the first year when applied to guinea grass and centro.

Nutrition trials at Mt. Mee have shown that the soils there require at least 6 cwt./acre of superphosphate before worthwhile pasture responses are obtained. In one trial molybdenum greatly increased legume yields.

On the Darling Downs, high yields of makarikari grass were obtained under irrigation and with nitrogen applied at 400 lb./acre. Dry matter production was 10,000 lb./acre for the summer season and levels of nitrogen over 200 lb./acre increased not only yield but also protein content of the grass. In the Dawson-Callide the yield of Preibe's prairie grass under irrigation was increased from 1,100 to 7,600 lb./acre in the winter-spring by the application of 200 lb. of nitrogen per acre.

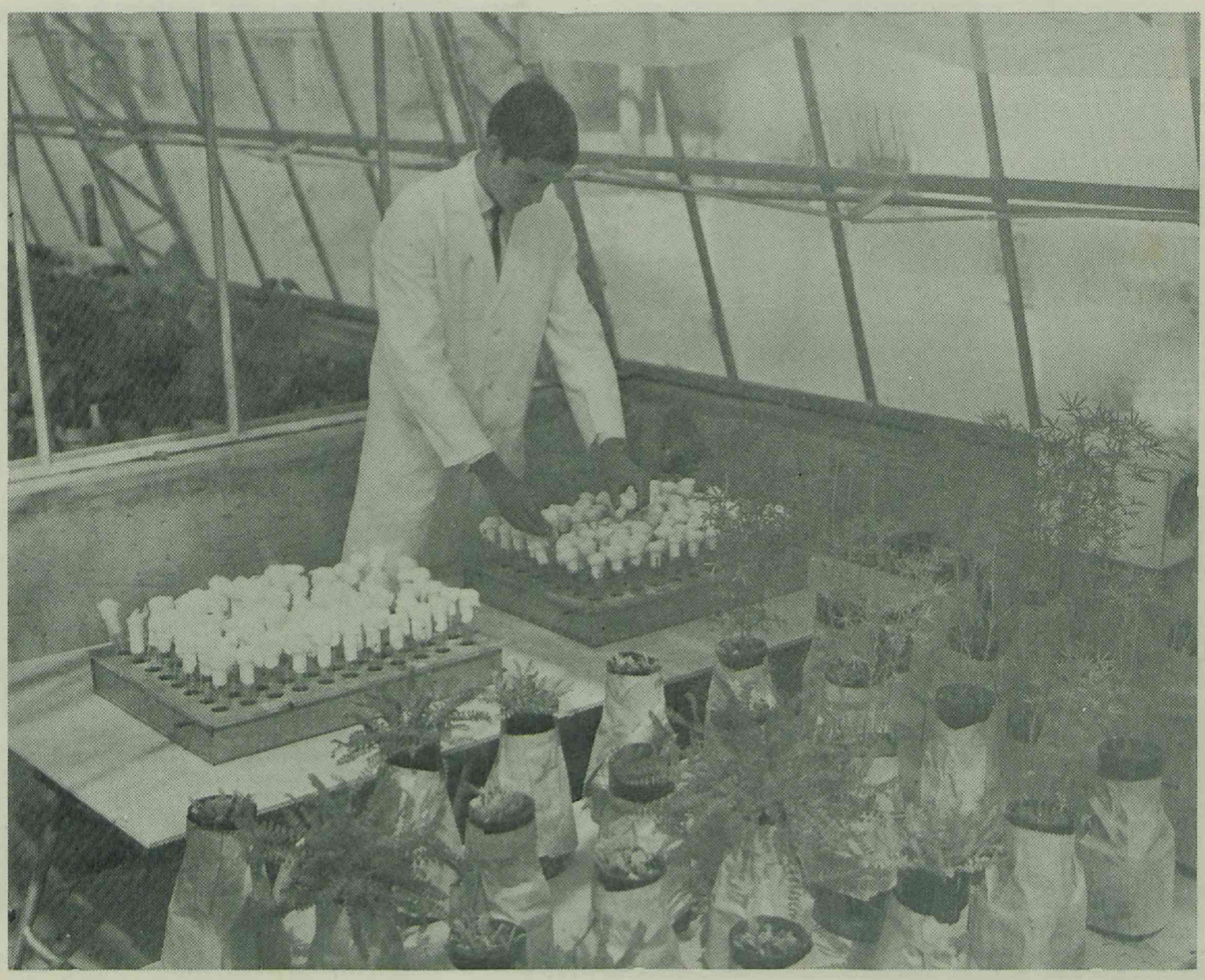
At Cooroy, in experimental plantings of legumes in mat grass, full cultivation gave better results than spraying the mat grass with dalapon. Both of these methods were superior to planting in "rotavated" strips. Sirato was less sensitive to establishment conditions than Tinaroo glycine. Desmodium and Glycine varieties were successfully established in kikuyu grass both in prepared seedbeds and after spraying with dalapon. Greenleaf desmodium was the outstanding legume under such conditions.

The "Triad" precision depth seeder developed at the Queensland Wheat Research Institute for grass sowings in heavy soils has proved its value. Establishment results with Rhodes and makarikari grasses continue to show substantial advantages for the Triad compared with conventional grass seeding techniques.

It has frequently been observed that freshly harvested seeds of some pasture species have a very low germination. Some fresh seed may have a germination of only 10%, which may rise to 60 or 70% as the seed ages. Laboratory investigations have shown that substances inhibiting germination are present in the fresh seeds and two such substances have been identified. The work is being pursued to see if the inhibiting effect can be counteracted.

In pot tests, a short sward (2 in.) of kikuyu grass produced a regrowth of better quality and quantity than a longer sward (6 in.). Moreover, the longer sward used more water, which points to a fallacy in maintaining a long sward as a "drought reserve".

Populations of the pasture white grub in the Bunya Mountains study area were virtually eliminated during autumn by the milky disease (*Bacillus popillae*), previously unrecorded for this host. The disease may prove to be one of the major natural controlling factors of the serious pest.



Testing of root nodule bacteria for nitrogen fixing ability in legumes is a prerequisite to successful use of pasture legumes.

Two successful large-scale funnel ant control demonstrations are nearing completion on the Atherton Tableland. These demonstrations are the end-point of 5 years' study of funnel ant pasture problems. The results show that careful pasture management is a successful and economic way of controlling funnel ants, and steps can now be taken to prevent spread of this pest and reduce the 10,000 acres already infested.

Trials over a period of 3 years have provided a relatively inexpensive method of insecticide usage without the problems of residue and long withholding period for the control of both species of pasture web-worms in Northern Tablelands dairy pastures.

Entomologists face many problems in pasture maintenance. This view is of pasture shaved of dry grass by termites.

Biological studies of the black soil scarab, a pasture pest of the brigalow development areas, have demonstrated that larvae are capable of survival for more than 4 months in dry soil without food. This factor adds to difficulties in determining economic control of the pest.

DAIRY PASTURE SUBSIDY SCHEME

The Dairy Pasture Subsidy Scheme, which has now operated for two years, provides for a subsidy to all registered dairy farmers currently in commercial production. The subsidy is a dollar for dollar payment, up to a maximum subsidy of $14 per acre, for plantings of approved perennial pastures up to 20 acres in any one year, with a maximum of 100 acres.

An increase of nearly 60% in approved applications, from 2,354 for the year 1966-67 to 3,670 for the 1967-68 period, indicates that the scheme has now received general acceptance by dairy farmers in this State.

Since the Scheme commenced, 4,193 registered dairy farmers have received approval to plant pastures eligible for subsidy, involving 6,924 applications.

The total of 3,670 applications approved for the year under review included repeat applications from 1,831 dairymen who received approvals in the first year of the Scheme and applied again this year.

A survey has been planned for the major districts to discover why more farmers have not made repeat applications. The opinion has been expressed that in some districts the areas of improved pastures sown last season under favourable conditions are providing sufficient grazing for current herd requirements. Also, in some cases, farmers who originally planted over 20 acres were due for deferred subsidy this financial year, which would preclude them from immediate payment on any fresh areas laid down. These farmers could well be waiting for the 1968-69 year.

A comparison of approved applications for the nine regions is a follows:—

——	No. of Registered Dairy Farms 1966–67	Approved Applications 1966–67	% of Registered Farms	No. of Registered Dairy Farms 1967–68	Approved Applications 1967–68	% of Current Registered Farms	Number Increase
Wide Bay	2,042	754	37%	1,945	1,012	52%	258
East Moreton	1,632	350	21%	1,478	487	33%	137
North Queensland	628	283	45%	572	288	50%	5
West Moreton	1,981	250	13%	1,838	671	36%	421
Eastern Downs	2,068	228	11%	1,939	388	20%	160
North Burnett	1,249	191	15%	1,130	259	23%	68
South Burnett	1,300	187	14%	1,164	372	32%	185
Central Queensland	757	80	11%	616	130	21%	50
Western Downs	479	31	6%	400	63	16%	32
	12,136	2,354		11,082	3,670		1,316

The greatest percentage increases occurred in West Moreton, South Burnett, Central Queensland and the Western Downs. Most of these areas experienced poor planting conditions in 1966-67 and the response reflects the favourable conditions this season. The percentage increase in other districts varies from 30% to 70%, with the exception of North Queensland, where a high proportion of all farmers entered the Scheme for the first year.

The total number of claims paid in the past financial year was 2,896 for a sum of $451,844. This meant that, to date, $630,762.24 has been paid as subsidy since the Scheme commenced in May 1966.

From the 2,354 applications approved in 1966-67 2,115 claims were received. Unfavourable weather about the end of the financial year resulted in the cancelling of many late approvals; under the circumstances, the fallout of 10% is not excessive.

With regard to acreage claimed, there is a much greater discrepancy. Of the area approved, 43,490 acres, only 29,170 acres were claimed, which represents a loss of about 33%. While cancelled approvals account for some reduction, the main loss appears to be due to planting fewer plots than were originally proposed. If this ratio is applied to the total area approved to date, 104,844 acres, it could be assumed that about 70,000 acres will be planted in the two completed years of the Scheme.

The following table illustrates the progress achieved.

——	To June 30, 1967	July 1, 1967 to June 30, 1968
Total number of approved applications to plant	2,354	3,670
Total area involved	43,490 acres	61,355 acres
Average area per application ..	18·5 acres	16·7 acres
Number of claims paid	785	2,796
Total amount of subsidy paid ..	$140,029.98	$451,844.75
Area covered by subsidy paid ..	11,569·50 acres	36,402·25 acres
Average subsidy per acre	$12.10	$12.14
Deferred payments made	..	$38,887.51
TOTAL SUBSIDY PAID since inception of scheme	..	$630,762.24
Subsidy held in deferment at 30–6–68	..	$59,924.11

The Central Committee has continued to seek improved procedures to reduce the time occupied by field and Head Office staff.

In keeping with the expressed policy of exercising flexibility in the Scheme, amendments have been made from time to time. It is fair to say that the Scheme is being administered with a minimum of restrictive conditions while still maintaining effective control. Any reasonable proposal for variations in procedure, or elimination of anomalies, is considered and adopted if this can be done without affecting efficient control.

Full support and co-operation have been received from the industry's leaders and executive officers on local Committees and on the Central Committee.

The aim is to establish the pasture under conditions most favourable to its development. With this in mind, some original conditions have been amended to allow treatments to be applied after sowing. Examples of this are the approval of post-emergence weedicides and insecticides for protection of seedlings against insect attacks.

In the two years of operation of the Scheme, it is estimated, 70,000 acres of new pasture will have been established under its auspices. In the light of findings that one acre of sown pastures can mean an increase in production of 100 lb. of butterfat per year, the potential value of the 70,000 acres is very considerable, and should help to offset the recorded loss to the industry of some 1,054 registered dairy farmers during 1967-68.

The records being obtained regarding costs of seeds and fertilizers, land preparation and planting and fertilizing operation represents a valuable source of information which is being examined by various Departmental officers.

It was pointed out in the report for 1966-67 that the administration of the Scheme was interfering with the extension services to the industry. The position has been alleviated somewhat by streamlining of Scheme procedures and by the appointment of some additional staff, but the level of advisory and inspectorial services to factories and to farmers is still below the optimal level sought.

Field Crop Research and Extension

WHEAT

In nine regional wheat varietal trials representing widely differing conditions of growth, the new variety Timgalen turned in an excellent performance, averaging 31·3 bus./acre compared with 27·2, 27·1 and 25·4 bus./acre respectively for other widely recommended varieties, Gamut, Mendos and Spica. An important feature of the trials was the outstanding performance of Timgalen where growing conditions were more favourable. In the five trials where average of trial yields exceeded 30 bus./acre, Timgalen yielded at a rate 25% higher than the trial averages. In the trials which yielded less than 30 bus./acre, Timgalen, Mendos and Spica yielded at approximately the same rate while Gamut yielded at 12% above the four trial averages.

A highlight of the annual wheat competitions conducted by the Royal Agricultural Society and other show societies in co-operation with the Cereal Chemistry Section of the Queensland Wheat Research Institute is the consistently outstanding performance of Spica. It combines a high protein content with a high yield of flour of good baking quality.

Following three years' research in the field and the laboratory, the critical levels of soil nitrogen and phosphorus for satisfactory growth of wheat can now be reasonably well defined. The important practical significance of this work is that fertilizer requirements can be assessed fairly reliably by rapid tests of soil samples in the laboratory.

For the fourth year in succession a highly significant correlation has been shown between the incidence of crown rot (*Gibberella zeae*) and time of planting, with early sowing giving the highest infection. Some Australian varieties have been shown to possess a reasonable level of resistance to common root rot (*Helminthosporium sativum*).

A study was made of the optimum time of replacement of machinery on Darling Downs wheat farms. Factors such as equipment cost, working life, repair costs and taxation concessions were incorporated into a single equation model of machinery replacement from which the optimum time of replacement can be determined. Allowance was made for various income levels and different ownership arrangement in order to provide a comprehensive picture of machinery replacement in practice. Data were obtained from 75 co-operating farmers in a project financed by the Australian Wheat Research Council.

BARLEY

At Hermitage Research Station in 1967, 15 of 36 varieties in a barley varietal trial outyielded the standard commercial variety, Prior (38·4 bus./acre), by up to 50%. On the basis of these results, the availability of seed of promising new varieties and the enthusiasm of the barley plant breeder, the barley varietal testing programme is being increased manyfold to include 22 testing sites in southern and central Queensland grain districts in 1968.

The increasing importance of the barley crop for malting purposes has led to studies of the malting quality of Queensland-produced barley. There are indications that the widespread use of nitrogenous fertilizers may cause an overall decline in the malting quality while increasing yields and protein contents. Because the type of protein could have some influence on malting properties an investigation has begun of this aspect. Malting-quality studies will be greatly facilitated by the micro-malting equipment purchased from funds supplied by the barley industry.

GRAIN SORGHUM

De Kalb E57 hybrid grain sorghum yielded an average of 63·2 bus./acre and topped the list in the nine trials comprising the 1967 regional grain sorghum varietal testing programmes. Second was Texas 610 (59·6 bus./acre), followed by Pacific 361 (58·3 bus./acre), Texas 626 (57·8), PXO (57·7), Pioneer 846 (57·7), Yates NK212 (57·0). Alpha, the only open-pollinated variety under test, yielded 39·8 bus./acre.

Important information on lodging resulted from two Biloela Research Station trials. One trial grown on a long fallow with adequate soil moisture survived the dry season with no lodging. A second trial planted on short fallow land suffered severe lodging. The variety Alpha and two experimental hybrids survived longest and hope is held that these two hybrids may prove useful in the Central Queensland region.

MAIZE

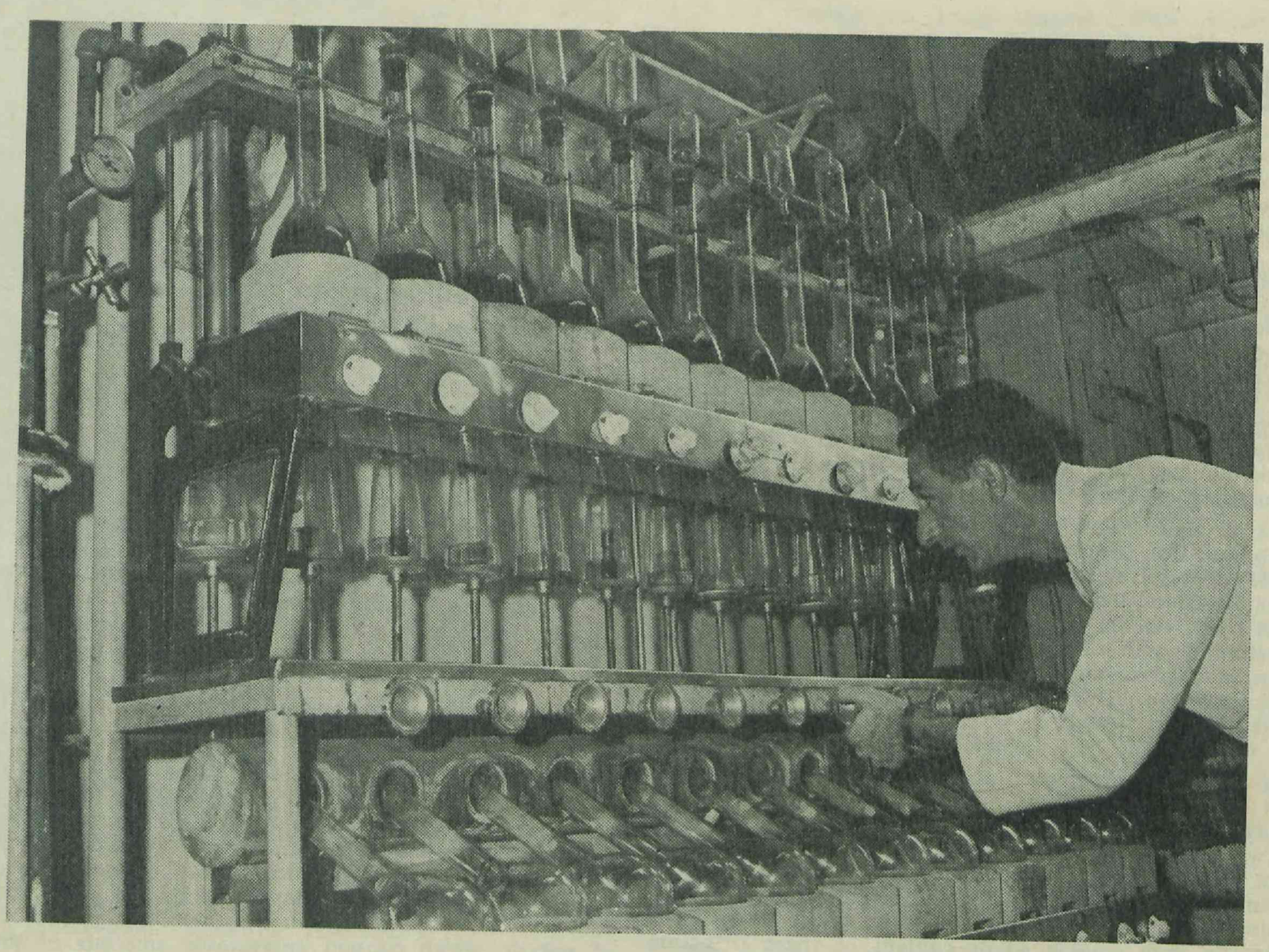
Cultural practices such as early ploughing and burning of residues had little effect on the incidence of ear rot (*Diplodia macrospora*) in experiments in north Queensland. Fertilizer treatments did however give a significant reduction in incidence. Stalk rot (*Marasmius sacchari* var. *hawaiiensis*) was found to be increased after a grass-legume pasture in an experiment at Kairi Research Station.

The breeding and varietal testing programme was continued on the Atherton Tableland. The Departmental hybrid QK 37 will be grown for commercial seed on the Tableland following the completion of a probationary period by several growers.

TOBACCO

An extensive breeding and varietal testing programme is being carried out. Mould-resistant material bred by C.S.I.R.O. is being evaluated in Departmental trials; no lines so far possess resistance to the strain of blue mould present in southern coastal Queensland. The variety Hicks Q46 has been evaluated in trials for 3 years and under commercial farm conditions for 1 year. It is currently undergoing a series of manufacturing tests. The variety NC95 has shown resistance in its first year of farm tests to bacterial wilt common in the Ingham district. The standard variety Hicks is quite susceptible to this disease. Both yield and leaf quality of NC95 are good and the leaf has sold readily. Yield of this variety in southern Queensland has also been high over three seasons.

In Queensland, suckers and weed control are important factors in production costs and local research has made important contributions in both these fields. On the basis of research results, supplies of the sucker control agent Penar were imported for farmer use. This material, which can be sprayed onto the plant, is vastly superior to mineral oils for sucker control. Other sucker control chemicals undergoing assessment give control equal to that given by Penar.



Kjeldahl apparatus used for the determination of nitrogen in grains, soils and plant material.

The herbicide Balan (benefin) has given satisfactory results in trials and has been released for commercial use. Efficient application and soil incorporation are essential for good results, but control of grass weeds for more than 3 months can be obtained.

Nocturnal behaviour and populations of tobacco pests under field conditions have been studied by means of field light traps. From data of this kind it may be possible to offer a pest prediction service to farmers.

COTTON

The skip-row technique (plant 2—skip 2) is proving beneficial in raingrown cotton production, and yield increases in some commercial plantings have exceeded expectations.

Twelve fertilizer trials have shown nitrogen to be the fertilizer needed most for cotton production, especially under irrigation. Rates of application of nitrogen up to 150 lb/acre have given significant yield increases. Phosphorus and potash have also been found necessary for some irrigated crops in the Lockyer and on the Darling Downs.

Assessment of varieties continues. The varietal position is more critical in southern Queensland, where the growing season is shorter and where faster maturing varieties than the current Delta-Pine Smooth Leaf are required. Improvement in seedling growth on the Darling Downs can be effected by an irrigation soon after emergence. This increase in seedling growth rate becomes critical as boll formation during cool weather tends to give low-micronaire cotton.

Studies in the effects of water stress on cotton yields have indicated the necessity for good soil moisture supplies immediately after squaring and especially during flowering.

PEANUTS

Leaf spot of peanuts (*Cercospora* spp.) has been very effectively controlled in trials on the Atherton Tablelands. A fungicide containing triphenyltinhydroxide gave outstanding control and increased yield by 52% compared with unsprayed plots. The widespread use of leaf spot fungicides is increasing the yield and quality of peanuts in northern areas.

SUNFLOWER

The high oil content of Russian sunflower varieties has stimulated varietal research in this field. In trials conducted at Walkamin Research Station and with irrigation on the Darling Downs, yields in excess of 2,000 lb./acre have been achieved with some of these varieties and an intensification of testing will occur in 1968-69.

NAVY BEANS

Gallaroy, a new variety bred by Departmental plant breeders, is destined to play an important part in the expanding navy bean industry. It is a large-seeded variety, of earlier maturity than Kerman, and has a moderately high yielding ability. These two varieties, together with a number of other promising strains, will be included in an expanded regional testing programme commencing in 1968-69.

SOYBEANS

Encouraging results are being obtained from the second year of intensive soybean research being conducted at Hermitage Research Station. The data available reinforce the position of the variety Hill, which topped the early-maturing varieties with a yield of 1,975 lb./acre. In a 1967 varietal trial, Hill was placed second with a yield of 2,089 lb./acre. The variety Dorman was placed second and third in the two trials, with yields of 1,750 and 2,046 lb./acre respectively, the trial averages being 1,421 and 1,417 lb.

RICE

Successful rice research at Millaroo Research Station has led to the establishment of a small rice industry in the Burdekin region. High yields of paddy in excess of 6,000 lb./acre have been achieved in trial plots on occasions and commercial yields of around 2 tons/acre are obtainable with the existing variety. Interest now centres on the performance of new varieties recently obtained from the International Rice Research Institute in the Philippines. Rice has also performed well on the Arriga soils near Mareeba, where paddy yields of 4,900 lb./acre have been recorded.

LINSEED

The best of the new linseed varieties available outyielded the most widely grown commercial variety, Bonnydoon, by up to 14% and 23% respectively in two varietal trials at Hermitage Research Station in 1967. District varietal trials are being sown at a number of centres on the Darling Downs in 1968 to test the promising new varieties over a wide range of conditions.

Laboratory and field work have shown that the various climates of the State influence the quality of oil from any particular variety of linseed. Further studies have shown that the average temperature during the growing season has a considerable effect on oil quality and it may now be possible to choose a variety most suited to a particular region. More detailed studies have thrown light on how temperature affects quality through the constituents of the oil. The recent acquisition by the chemical laboratory of an electronic oil tester and mill will greatly facilitate and accelerate the analyses of oil seeds.

Horticultural Research and Extension

DECIDUOUS FRUITS

The variety improvement programme at the Granite Belt Horticultural Research Station is now well established, with its major objectives early-maturing red dessert apples, early and mid-season yellow-fleshed peaches and nectarines and plum varieties maturing before and after the popular Wilson variety. Already some 4,800 seedling progeny of apple crosses are in the seedbed and orchard row stages and are being grafted on mature bearing trees to accelerate wood maturity and promote early fruiting to expedite preliminary selection. Seedling progeny of peach and nectarine crosses are advanced to the stage where some, at least, are expected to fruit in 1968. Plum breeding has been hampered by previous frost damage but the progeny of 1967 crosses are progressing satisfactorily.

Work on water relations has led to the development of a rapid technique for determining critical levels of water stress in the trees themselves, which is a more positive indicator of water requirements than soil moisture determinations. The method is based on the rate of infiltration of paraffin through the leaf stomata and, since it involves no complicated equipment, can be used in commercial orchards as a guide to the timing of irrigation. This is particularly important in view of the limited water resources of the Granite Belt and the necessity to make the best possible use of available water.

Leaf scorch is prevalent in the Granite Belt following irrigation even where water salinity is not high. Investigations have shown that the total soluble solids content of irrigation waters, which is commonly high in the district, is more important than their chloride content alone. Hence, conductivity measure is being substituted for chloride determination and the laboratory is equipped to provide this service to growers. The generally high soluble solids content of these irrigation waters indicates the need for greater use of night irrigation or the adoption of under-tree irrigation methods. The latter will be further investigated.

The two-spotted mite has become a problem species throughout Australian deciduous fruit orchards. Detailed studies on population behaviour under various conditions of temperature, humidity and apple tree nutrition in the Stanthorpe district have elucidated some of the basic factors operating in favour and against pest survival and increase.

Because of the importance of the apple crop to the fruit industry, further studies of post-harvest behaviour have been conducted on the main varieties. Fruit from the 1967 crop was the first to be treated commercially with diphenylamine for scald control and excellent results were obtained using a concentration of 2000 p.p.m. In the 1967 season, apples were stored commercially in an atmosphere containing 2·5% oxygen and 2·5% carbon dioxide. This commercial development is the result of intensive research over many years at the Department's Food Preservation Research Laboratory. The commercial trials resulted in Delicious and Granny Smith apples of excellent quality being available in the last months of the year, which is not possible by normal cool storage methods. In addition to extending the life of apples in cool storage, controlled atmospheres help to maintain the apple in good condition for a long period out of store.

Cool storage trials with grapes packed in sealed polythene bags with sulphur dioxide as a fungicide have given promising results. Methods of liberating sulphur dioxide more gradually into the storage atmosphere to avoid a high initial concentration and subsequent damage are being investigated.

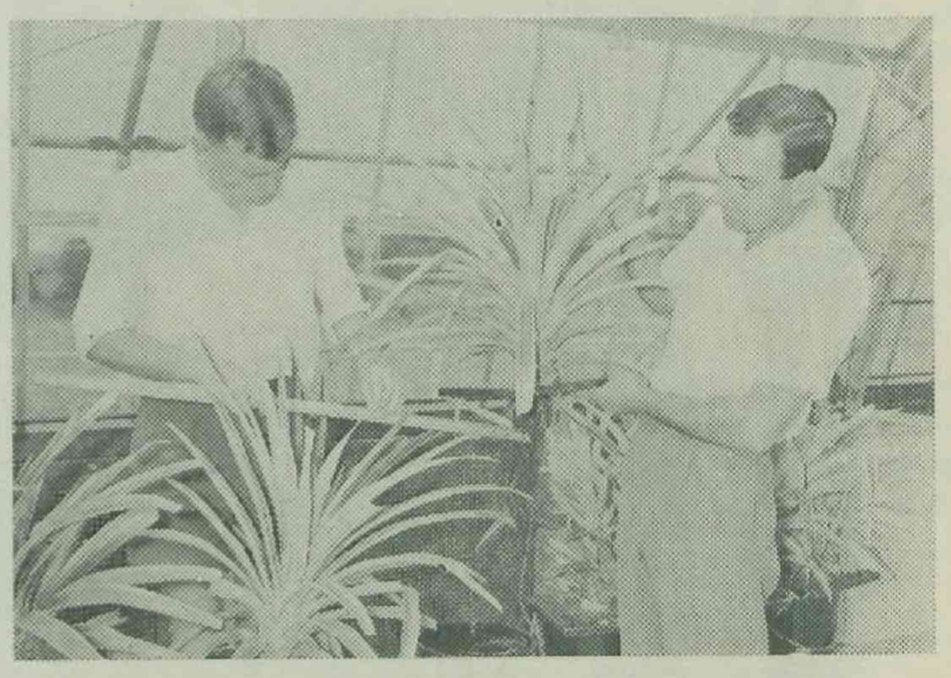
PINEAPPLES

In a series of trials at the Maroochy Horticultural Research Station, four of the selected pineapple clones have proved distinctly superior to field-run planting material. Trials have now been extended to the major pineapple-growing districts to assess the performance of the selections over a range of soil and climatic conditions. Steps are now being taken for rapid multiplication of planting material of the best clone for distribution to growers.

The canning suitability of selected clones has been further studied on a regional basis. The six best clones were examined and compared with field-run material. In most cases the relative suitability for canning of the various clones was comparable in each district. It was shown that canning quality was adversely affected when the fruit was treated with NAA sprays 6–10 weeks before harvest in order to increase fruit size.

Relationships established between translucency and various physical and chemical characteristics of the pineapple indicate that translucency is a very satisfactory index of ripeness.

Recent nutritional work at the Pineapple Research Laboratory and in the field has been concerned with modification of the balanced fertilizer schedule to include foliar application of all requisite nutrients. Evidence has been



Glasshouse studies have provided much of the basic information on which new pineapple fertilizer schedules have been designed.

obtained which suggests that plant responses to foliar applications of potassium are influenced by the season of the year and that lower temperatures reduce the growth responses. In some cases, high concentrations of potassium in the foliar sprays have been accompanied by an apparent retardation of growth. Investigations to date suggest that such toxic effects can be attributed to impurities in fertilizer grades of sulphate of potash, which contain appreciable amounts of phosphorus and chloride.

Control of flowering and fruiting with NAA and BOH is now a well-established practice in pineapple plantations. However, when plants are in vigorous vegetative growth, artificial flower induction with NAA is not entirely reliable. This has been suspected to be associated with high levels of nitrogen but recent work has failed to show any such effect from either sulphate of ammonia or urea when applied during the 6 weeks preceding flower induction treatment. There is some evidence, however, that high nitrogen may slightly delay the appearance of the inflorescence.

The fungicides Difolitan and Dexon continue to give good control of top rot (*Phytophthora cinnamomi*) under experimental conditions in the Cooroy area. Further aspects of their use, such as the optimum time and rate of application, are being examined this year.

BANANAS

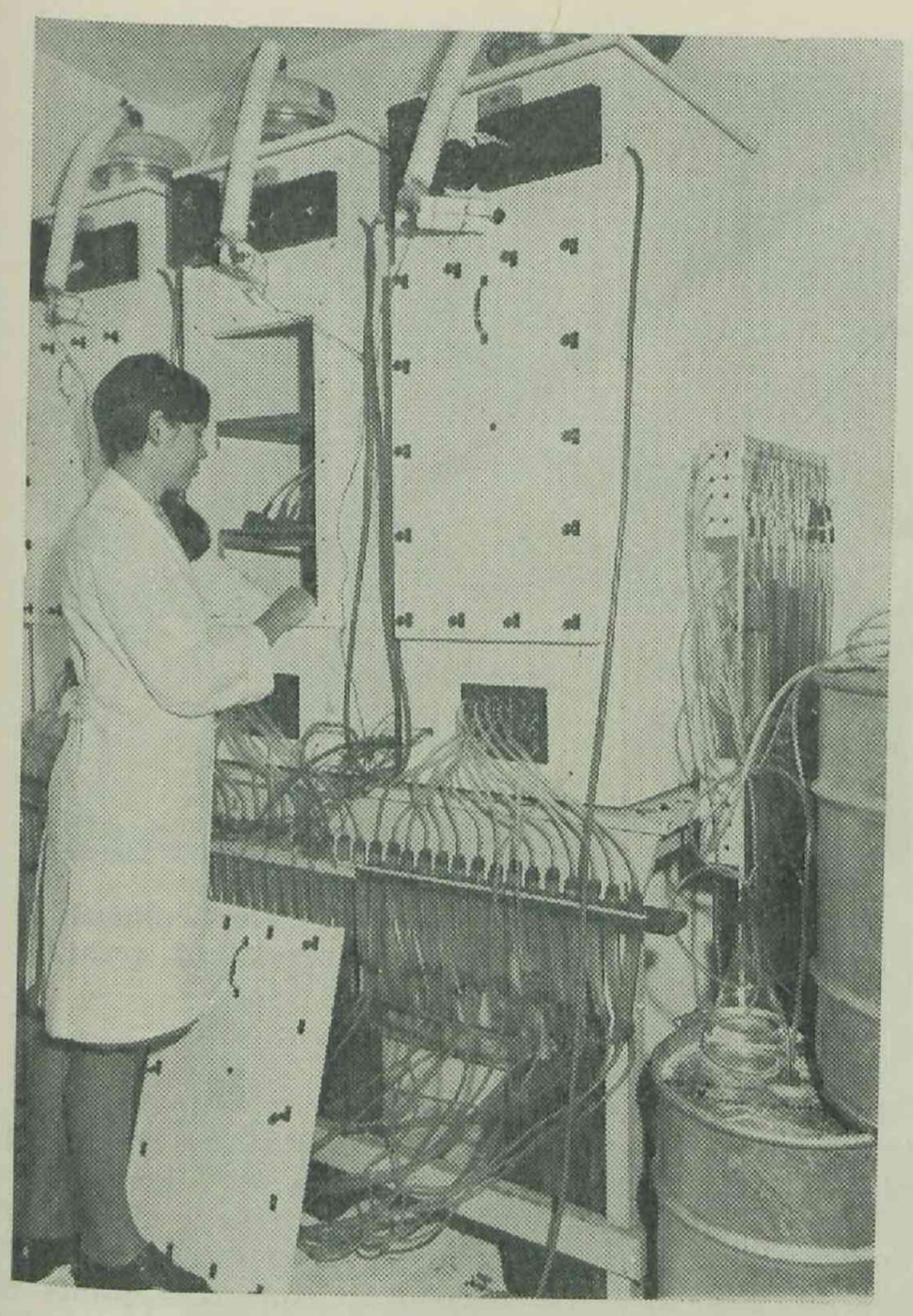
Of the local selections within the Cavendish variety two strains have shown superiority in trials at the Maroochy Horticultural Research Station. These, together with eight varieties introduced from Jamaica and the Philippines, have been multiplied for use in district trials. Further multiplication under quarantine is now in progress in North Queensland to permit trials in all parts of the State and as a stage in the multiplication of sufficient quantities of planting material for release to the industry.

Results of fertilizing trials in North Queensland confirm the importance of the preplanting application of a complete fertilizer high in potassium. Yield data indicate no significant response to side-dressings when applied later than 6 months after planting.

Trial at the Maroochy Horticultural Research Station and at Buderim have shown significant increases in bunch and fruit size resulting from removal of the "bell", or apical part of the inflorescence, at an early stage in bunch development.

In order to examine the possibility of shipping North Queensland bananas to New Zealand, a trial shipment of hands treated with a fungicide and packed in sealed polythene bags containing vermiculite impregnated with permanganate to absorb ethylene was made. Most of the control fruit arrived over-ripe whereas the treated fruit was in excellent condition.

Previous experiments had shown that the green life of bananas is increased by 0·9 days for a decrease in temperature of 1° F over the range 53–71° F. Further experiments have shown that this relationship between temperature and green-life is dependent on the stage of maturity at which the fruit is picked. Trials have indicated that a concentration of ethylene 0·2 p.p.m. can very significantly reduce the green-life of bananas.



Banana storage experiments are conducted in these constant temperature cabinets at the Food Preservation Research Laboratory

PAPAWS

Re-purification of the Petersen and Bettina parents of Hybrid 5 has been completed at the Maroochy Horticultural Research Station, subject to final checking of uniformity and trueness to type in 1968. It is, therefore, expected that resumption of production of seed of the hybrid will be possible in the near future.

Papaw dieback has been a recurrent problem over many years and investigations to date have failed to reveal the precise cause of or remedy for this disorder. Current research is directed towards physiological aspects of dieback with particular reference to calcium metabolism.

Last year attention was drawn to problems associated with internal corrosion of cans of processed papaw. Similar difficulties encountered in other countries with a number of fruits and vegetables have been found to be primarily due to the oxidative action of nitrates in the fruit juices. Intensive investigations have been carried out which have shown that reserves of nitrogen in the papaw plant tend to accumulate as nitrates in the fruit. Comprehensive surveys, field trials and laboratory determinations have revealed a very delicate balance between nitrate accumulation in the fruit and soil nitrogen and nitrogen applied in the fertilizer.

As a result of these investigations it is now possible to recommend a modification of fertilizing schedules which will minimise nitrate accumulation. Its essential features are adjustment of nitrogen fertilizing to the soil content, elimination of nitrogen fertilizer applications after flowering and the use of urea foliar sprays during the harvesting period. The adoption of these practices has already substantially reduced the problem, but work is continuing.

CITRUS

Queensland has some natural advantages in the production of mandarins, particularly early varieties. Unfortunately, the earliest varieties available are of poor quality compared with the mid-season varieties and the primary objective of the citrus breeding programme is to combine quality with earliness. Citrus breeding is complicated by the preponderance of nucellar seedlings of the female parental genotype which are normally produced. More than 1,000 seedlings have been raised from last season's crosses and it is hoped to obtain sufficient sexual seedlings to provide an adequate range of hybrids for selection.

Stock/scion trials in several citrus-growing districts are now coming into bearing. In the case of Valencia Late oranges the Benyenda strain has to date slightly outyielded the Newton and Victoria strains. The highest yields were obtained on Cleopatra stocks and the lowest on *trifoliata*; rough lemon, sweet orange and Emperor were intermediate. In the case of lemons, the rough lemon rootstock produced the highest yields, the highest yielding stock/scion combination being Eureka on rough lemon. Villa Franca and Thornless Lisbon produced a greater proportion of their crop in the warmer months of the year on rough lemon than on other rootstocks.

Nutritional investigations are providing cumulative evidence that the best responses to winter applications of nitrogen are obtained from July-August applications provided irrigation is applied.

Considerable attention has been given to chemical weed control in citrus orchards, which is complicated by the fact that few weedicides will effectively control couch and nut grass without some tree damage. To date, the uracils have provided a good initial kill and subsequent control of couch and nut grass with no evidence so far of tree damage even at relatively high rates of application. Bromacil and Terbacil have been found to produce no significant tree toxicity symptoms over a period of 3 years since trials were commenced.

Citrus budwood supplied to growers from the Citrus Budwood and Seed Distribution Scheme increased by 21·5% over last year's supplies, to a total of 120,400 buds. The demand for each of the three main orange varieties increased during 1967, the greatest increase being for Navels. The demand for both Ellendale and Emperor mandarins increased, but there was an appreciable drop in orders for Glen Retreat, offset by an increased demand for early variety Imperial.

Further studies have been made on the factors affecting the processing suitability of Queensland oranges, using Valencia oranges from five rootstocks and three strains harvested over a period of 4 months. As the production of Ellendale mandarins is reaching a stage where a surplus might soon be available for processing, investigations are in progress to study the processing of this juice.

STRAWBERRIES

The variety Redlands Crimson, bred at the Redlands Horticultural Research Station, has performed extremely well in grower trials in both North and South Moreton districts. Virus-free runners for general distribution are now being produced and should be available in quantity for next season's planting. Several other new lines are currently undergoing trial.

The superior performance of virus-free Special Runners is well recognised and they have been in keen demand. For the 1968 plantings, 370,000 Special Runners of Phenomenal and Majestic were available. Provision has been made for the production of increased quantities at Boonah and Neusavale and this will include the first distribution of virus-free runners of Redlands Crimson.

Heat therapy continues to be a potent force in the production of improved strawberry runner material. The mild virus present in Phenomenal last year has been eliminated by this method. Improved screenhouse facilities were made available this year enabling use to be made of extended day length. This has increased the output of virus-free parent material for the Strawberry Runner Approval Scheme.

The storage life of strawberries has been increased by treatment with ethylene oxide for 24 hours.

PASSION-FRUIT

Two of the unfixed hybrids of *P. edulis* and *P. flavicarpa* have largely superseded the purple passion-fruit because of their extremely high yielding capacity. However, in view of claims that these particular hybrids are inferior to the purple *P. edulis* for certain processed products, other hybrid lines are being re-examined for processing qualities. At the same time the breeding programme is continuing towards the original objective of obtaining genetically fixed varieties combining resistance and the requisite fruit quality.

The processing suitability of the major passion-fruit varieties and other selections is being evaluated. The hybrid types are higher in acidity and lower in total soluble solids but the flavour characteristics have been variable.

POTATOES

Difficulties occur with certified seed potatoes from southern States due to variations in price, quality and incidence of non-virus diseases. Such seed also arrives too late for early winter plantings. A study of the performance of potatoes planted with different sources of seed is being undertaken in co-operation with the Departments of Agriculture in Victoria and Tasmania. In addition, seed potato production in Queensland is receiving attention.

In potato investigations in southern Queensland, a single application of disulfoton granules at planting has given virtually the same degree of jassid control as five foliage applications of DDT or demeton-S-methyl during the growing season.

In potato storage trials, DDT and derris gave the most satisfactory control of potato moth, provided the tubers were free of infestation at the commencement of storage. Malathion,

although giving satisfactory results in preliminary studies, was proved to be of doubtful value when used on tubers carrying moist soil, as when newly harvested.

The experimental fungicide Du Pont 1991 has given promising results in glasshouse tests against stem-end rot of potatoes caused by *Fusarium solani* and *F. oxysporum*.

The processing suitability of Queensland-grown potatoes is being investigated and it has been shown that potatoes with a S.G. below 1.06 are unsatisfactory. A storage temperature of 60°F is the minimum at which potatoes can be stored and still produce good coloured crisps.

PEAS

Plant density trials and growth studies have been undertaken with the object of increasing the yield of peas grown for processing. Due to prolonged wet weather at planting time the only data available are from a mid-season planting. In this the optimum sowing rate with the Queensland bred variety Fiesta was approximately 200 pounds per acre which yielded in excess of 6,000 pounds per acre.

The value of trifluralin, prometryne and propazine for weed control in peas has been established and further trials are in progress with combination herbicides for post-emergent sprays.

BEANS

A line of stringless beans bred and selected for greater cold tolerance than Redlands Pioneer and Redlands Autumn-crop is currently undergoing extensive field trials prior to bulking and commercial release. Breeding of round-podded stringless varieties to meet the requirements of the rapidly expanding processing industry is already well advanced.

Production of Approved Bean Seed received a setback as a result of serious outbreaks of halo blight in the North Queensland seed-producing areas in the 1967 season. The disease situation was aggravated by the presence of a strain of the bacterium *Pseudomonas phaseolicola* which does not exhibit the characteristic halo symptom, thereby rendering the disease more difficult to detect until the late stages of growth. In an effort to safeguard the major bean seed producing areas on which Queensland and other States depend, quarantines have been introduced restricting the entry of seed into the Burdekin and Mareeba areas.

Investigations have shown that harvesting of pods at the correct stage of maturity was of far greater importance than temperature in the post-harvest deterioration of French beans.

TOMATOES

In addition to material bred at the Redlands Horticultural Research Station, a range of introduced varieties, principally from the U.S.A., have been under trial in the Bowen, Redlands and Stanthorpe districts. The variety Roma grown for processing has outyielded other varieties and the influence of plant density on yield in this variety has been the subject of trials in the Bundaberg district. These suggest that spacing of less than 3 ft. in the row tends to reduce fruit size and total yield.

Tomato growth studies at Redlands Horticultural Research Station have yielded results of great value.

On the red loams, applications of side-dressings of complete mixtures may reduce yields and are conducive to blossom-end rot. These effects are being investigated on the sandy soils of the Stanthorpe district, where the disorder is a major problem and where it is current grower practice to apply at least two side-dressings. Anti-transpirants have also been investigated as a possible means of reducing transpiration losses and fruit disorders such as blossom-end rot. Pot trials have failed to demonstrate any reduction in transpiration rates with the materials tested and evidence obtained indicates that wilting precedes stomatal responses to water stress.

Dipping tomatoes in wax emulsions has improved their appearance and extended their shelf life.

GINGER

Bacterial wilt (*Pseudomonas solanacearum*) was serious again this year and represents a potential threat to the industry. Contrary to previous opinions, biotype 4, the most virulent biotype on ginger, has been shown in an extensive experiment in the Nambour district to have a wide host range, including many weeds. The Ginger Seed Approval Scheme, when it becomes operative, should help to minimise the spread of the problem.

Investigations aimed at producing more economically high quality syruped ginger have continued. Studies using sucrose and invert sugar have shown that ginger should be syruped over a 9-day period to obtain maximum drained weight, sugar absorption and best appearance. The rate of concentration is critical and must be reduced as concentration increases. A close study is being made of the flavour components of Queensland-grown ginger, as essence manufacturers have reported a citrus-like flavour in the volatile oil.

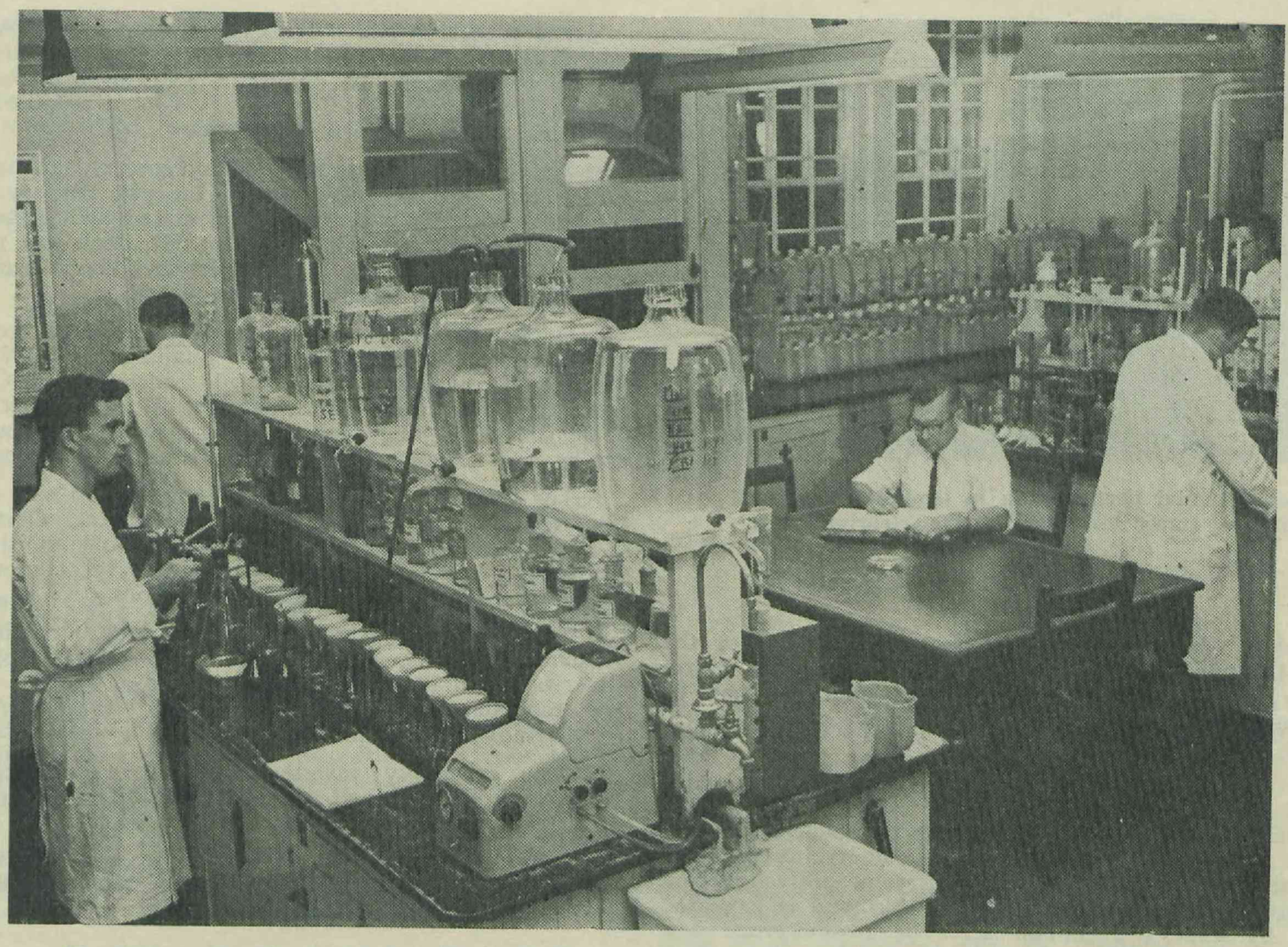
General Agricultural Research and Services

DEVELOPMENT PLANNING

The Division of Development Planning and Soil Conservation co-ordinated the activities of other Divisions with respect to the detailed soils and land classification studies and economic analyses of the proposed Emerald Irrigation Area, the results of which were presented as a Joint Report with the Irrigation and Water Supply Commission.

Good progress has been made in applying land classification criteria in land use planning activities in a number of areas. The revised land capability classification is based on the foundations laid by the United States Department of Agriculture but with more selective criteria defining limitations. Further advances were made in the provision of a land use planning service and some 39,648 acres of land were covered by these plans.

Development Planning officers, assisted by officers of other Branches, have actively co-operated with the Irrigation and Water Supply Commission in the conduct of soils investigations and sugar cane irrigation studies in the Bundaberg-Isis and North Eton districts. Water use models, based on the criteria established by C.S.I.R.O. Division of Land Research, were used in conjunction with weekly rainfall data to assess responses to irrigation and to determine sugarcane irrigation demand throughout the year and also possible maximum and minimum demand. These studies showed that response to irrigation was twice as high in the January to April period (1·2 tons of cane per inch of additional water used) as the September to December period (0·6 tons of cane per inch of additional water used).



Development projects require the analysis of thousands of soil samples in the Department's agricultural chemical laboratories.

As part of the Bundaberg-Isis irrigation investigations, an area of 206,000 acres was mapped in terms of 17 soil associations.

Technical assistance was provided to the Land Administration Commission with respect to the Fitzroy Basin Land Development Scheme. Seed testing services provided by Standards Branch ensured the quality of 68,000 lb of pasture seed purchased on behalf of settlers.

During the year, as a prerequisite to the launching of the re-orientated extension structure for assisting settlers in the Fitzroy Basin, a 4-day in-service school for 40 officers was held at Biloela. This school proved most effective in the formulation of general principles of brigalow development in the light of current circumstances and recent research findings from the Brigalow Research Station and other relevant sources.

WEED CONTROL STUDIES

Weed control studies in crops and pastures are being conducted at numerous centres.

In North Queensland, most emphasis to date has been on weed problems associated with the establishment and maintenance of tropical legume-based pastures. Research programmes have defined the tolerance of the main legume species to 2,4-D and 2,4,5-T and indicated the potential of herbicides for weed control in pastures containing these species. In addition, control of weeds in tea has been studied and methods of controlling regional weeds such as knobweed have been examined. Weed control work in maize has been initiated.

In the main grain-growing area of the Darling Downs, methods of control of three major weeds—wild oats, climbing buckwheat and bindweed—are being investigated and considerable success has been achieved with the use of chemical herbicides on wild oats (triallate and barban), climbing buckwheat (bromoxynil and picloram) and bindweed (2,4-D). The tolerance of wheat varieties to 2,4-D is being determined as this herbicide is widely used for broad-leaf weed control in wheat. Because of the persistence of picloram, studies on its movement and breakdown in clay soils are in progress. Consideration is also given to agronomic control measures, which have a particular significance in wild oat control.

In south-eastern Queensland, studies have concentrated on weed control in onions, cotton, citrus and peas, grass control in lucerne and methods of control of nutgrass. Herbicides are available which will give satisfactory control of weeds in cotton and onions and of grasses in lucerne, and methods of application and timing are being studied to improve their efficiency. None of the 11 herbicides used in the nutgrass control trial provided complete control, but bromacil and diuron warrant further study for non-selective control. In citrus orchards, the uracils have provided a good initial kill and subsequent control of couch grass and nutgrass, with no evidence of tree damage. Bromacil and Terbacil have produced no significant toxicity symptoms in trees over a period of 3 years.

The value of trifluralin, prometryne and propazine for weed control in peas has been established.

FURTHER IRRIGATION STUDIES

Supplementary irrigation trials in the Toowoomba area with maize and grain sorghum have confirmed findings from other areas that irrigation should be applied at flowering and until the grain is mature. The trials indicated that, where water was the limiting resource, some moisture stress prior to flowering was permissible without serious yield reduction. The policy of strategic watering over a larger area seemed to give better economic return than maximising yield on a smaller area by regular irrigations.

Field equipment such as this neutron soil moisture meter being calibrated by an agronomist is a great aid to irrigation and dryland studies.

Studies on irrigated crops have commenced in the Inglewood and St. George areas and initially the emphasis has been placed on soil amelioration problems. In preparation for the Nogoa Irrigation Scheme, a research programme is also under way at Emerald with cotton, maize, grain sorghum and winter cereals.

An investigation of spray irrigation practices with tobacco in the Mareeba-Dimbulah Irrigation Area has indicated that application rates generally are too high and that distribution patterns could be improved with closer attention to operation and layout.

Departmental participation in land development schemes starts long before the clearing stage shown here.

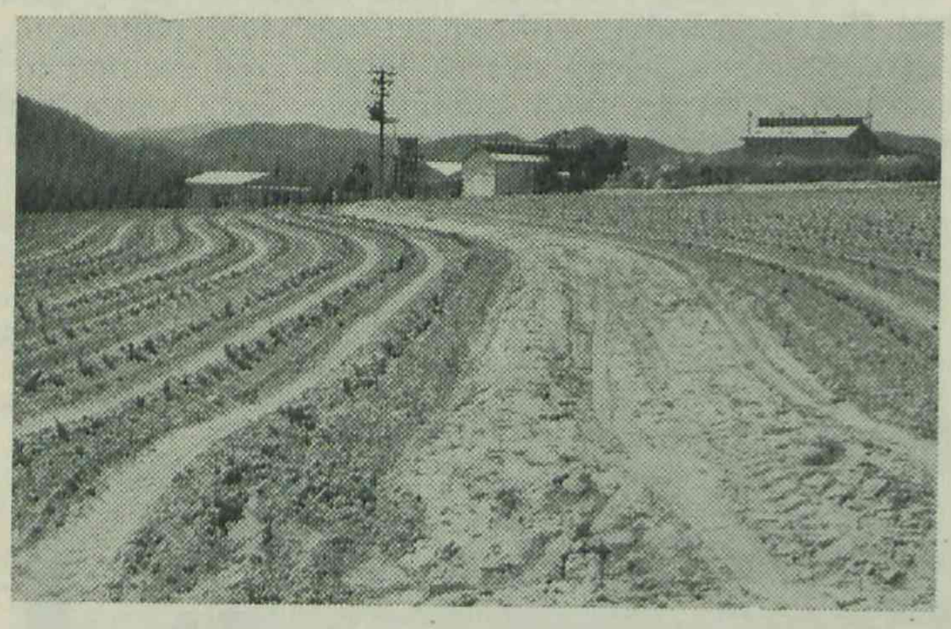
Irrigation programmes on the non-tobacco soils of the Mareeba-Dimbulah Irrigation Area have shown that maize, grain sorghum, peanuts, cotton, soybeans and rice can be grown satisfactorily.

SOIL CONSERVATION

A decline in interest by landholders in soil conservation has been a cause of concern to soil conservation workers during the year. About three million acres of cultivation land require soil conservation measures and this total is increased annually by some 0·2 million acres of erosion-prone new cultivations. Against this, 0·75 million acres have been dealt with in 21 years and in the current year 0·12 million acres have had contour practices installed plus an unknown but small area protected solely by retirement to pasture, stubble mulching and other similar practices.

Hence the State conservation effort is failing to reach minimal goals, and although the Department provides a free comprehensive technical service in soil conservation and is progressively gearing its staff to meet State and farmer needs the initiative in farm soil conservation programmes must rest with the farmers.

Against this background it is disquieting to record that in the year under review only 3,621 requests were made by farmers for soil conservation technical assistance. This total is 564 below that of the previous year and 1,079, or 23%, below the number of requests expected if the average annual growth had been maintained.



Contour farming of tobacco on the Mareeba-Dimbulah Irrigation Area.

Despite the substantial reduction in landholders' requests for soil conservation services, the total number of farmers applying soil conservation measures reached 6,026 at the end of the year and increased by 629, which is above the average annual growth rate. Site surveys required for strip cropping, contour cultivation and installation of contour banks were undertaken on 118,441 acres of cultivated land, representing a reduction of 9,984 acres below the previous year's total and 32,000, or about 21%, below the 150,000 acres which would normally have been achieved if farmer interest had followed the usual annual growth rate. Site surveys have now been undertaken by soil conservation officers on a total of over three-quarters of a million acres of the State's cultivated lands.

Support services including drafting and topographic surveys have been improved substantially during the year, firstly by the establishment of mapping facilities at four regional centres and secondly by the completion of topographic surveys on an area of 350,000 acres, bringing the cumulative total of surveys to 2·8 million acres.

The Wellcamp No. 1 Soil Conservation Project Area plan was finalised during the year and at present is open to inspection for receipt of objections prior to approval of the plan by the Governor in Council. Two more proposed Project Areas are under examination at present.

The soil conservation research and subject matter guidance section has been expanded during the year and as a result individual research projects have increased and a programme has been commenced which will provide technical guides to land use and soil conservation. In-service training programmes also have been expanded as a consequence.

During the year applications were received from eight landholders for financial assistance totalling $15,781 for which special procedural provision is made under the Soil Conservation Act. This is a surprisingly small response from over 6,000 soil conserving farmers and suggests that finance may not be a major factor limiting soil conservation programmes.

The number of graduate staff engaged on soil conservation research was raised to six during the year. Current lines of investigation are concerned with fallow moisture, soil erodibility, small catchment hydrology, level contour banks and strip cropping, and tillage investigations.

Water spreading investigations were continued at Jondaryan and Mt. Tyson. Vegetated stabilisation of grassed waterways and dam by-washes was studied further, verifying the recommended limiting velocities for kikuyu, African star grass, Rhodes grass and Queensland blue grass.

Soil erodibility investigations were continued on a Kingaroy krasnozem and the soil factors affecting the stability of krasnozems to rapid wetting were examined.

Rainfall and runoff measurements were continued on instrumented catchments at Kingaroy, Wandoan, Pittsworth and Brigalow Research Station (Theodore).

ENTOMOLOGY

Further studies on dichlorvos as a seed and grain protectant have demonstrated its value in short-term control of *Ephestia cautellain* both immature and adult stages. Fenitrothion has been shown to be the best available residual protectant for control of this species as well as providing equal or better control of the major Coleoptera pest species.

Progress has been made in determining the inheritance of insecticide resistance mechanisms in Queensland stored product pest species. A bank of mutants has been established for the major pest species.

A programme of fumigation investigations has been established, particular attention being paid to methyl bromide and phosphine.

Surveys of the incidence of diseases of insects have been continued with particular reference to pests of tobacco, pastures and cabbages.

Studies have continued on insecticide resistance in field and storage pests of tobacco. No new resistance has been recorded to Heliothis and the tobacco beetle.

Control of nematodes in a variey of crops was investigated. Replant failure in apple trees was controlled by preplant treatment with methyl bromide.

Large mechanical vacuum insect collecting machine for determining insect species and populations in field crops.

The introduction of newer insecticides has often increased pest populations of spider mites by destroying the natural controlling factors, and previously unknown species have become pests. A survey of species in Queensland has raised the number of recorded species from 15 to 45.

Detailed studies on population behaviour under various conditions of temperature, humidity and apple tree nutrition in the Stanthorpe district have elucidated some of the basic factors operating in favour of and against the survival and increase of the two-spotted mite.

FARM MANAGEMENT ACCOUNTING

Considerable development of the Farm Management Accounting Groups Scheme has taken place during the year. Computer processing of the monthly returns from co-operating farmers has made possible the provision of quarterly reports in addition to an improved style of annual summary.

Arrangements are being made for the formation of two new groups—one near Warwick and the other in the south coast area. It is expected that about 180 farms will be included in the analysis for the 1967-68 year.

Agricultural Standards

SEED CERTIFICATION

Production of certified seed during the 1966-67 season, except for hybrid forage sorghum, was adequate. Production of grain sorghum and hybrid maize seed—the two largest production items—amounted to 56,099 bus., compared with 57,080 bus. in the previous year. Seeds in the Seed Certification Scheme include hybrid maize, grain sorghum, sweet sorghum, hybrid forage sorghum, Sudan grass, French beans, cowpea and oats.

The two maize hybrids Pioneer Q300 and Pioneer 301, introduced in July, 1967, proved popular on the Darling Downs.

Plans have been finalised to use only certified French bean seed to produce approved bean seed.

A number of growers in the Atherton district after a satisfactory probationary period were granted registration of areas to grow QK37 as commercial certified hybrid maize seed. A small experimental crossing plot of Q1280 is being grown to determine the economics of producing seed of this hybrid in the Atherton district.

Consideration is being given to the inclusion in the seed certification scheme of Townsville lucerne and other pasture cultivars.

SEED TESTING

The following table sets out details of seed samples examined in the Department's seed testing laboratory during the past two years:—

Source of Samples	1966–67	1967–68
Inspectors of Branch	2,907	3,349
Seed certification	434	378
Experimental projects	490	264
Submitted samples		
(i) Merchants	4,457	5,246
(ii) Farmers	193	315
(iii) Government Departments ..	1,002	994
(iv) Dairy Pasture Subsidy Scheme	257	302
Export	893	710
Import	564	529
Totals	11,197	12,087

A short-duration storage trial of green panic seed harvested in 1966 was completed and results reported. An experiment on the mechanical dehulling of buffel grass seed is being developed as a co-operative project with C.S.I.R.O. Other trials completed during the year or in progress concern heterogeneity of green panic seed, germination of Townsville lucerne seed in the pod, germination behaviour of green panic seed under alternating temperatures, and the development of uniform testing methods for Callide Rhodes grass, sabi grass and creeping guinea grass.

A limited seed testing service has been instituted at Toowoomba to improve the service given to Darling Downs farmers and seed sellers.

PLANT QUARANTINE

Post-entry plant quarantine facilities for the handling of nursery stock and some seeds have been augmented with the completion of a second quarantine glasshouse at Indooroopilly. Provision has been made for the erection of a plant quarantine glasshouse at the Kamerunga Horticultural Research Station.

Outbreaks of disease during the past year in bean crops grown from imported seed have drawn attention to the risks associated with the bulk importation of seed for sowing. As a result of representations from the vegetable industry, steps are being taken for bean growers, processors, seedsmen and appropriate Government Departments to confer on possible means whereby local seed production may be planned and organized to meet industry needs without the necessity for bulk importations of seed.

AGRICULTURAL CHEMICALS REGISTRATION

Applications for the registration, re-registration or extension of registration of 4,283 agricultural requirements were received, compared with 4,354 last year.

The Agricultural Requirements Board considered the claims made by manufacturers regarding the efficacy of 1,494 preparations for which applications for registration or re-registration had been received.

During the year, 1,143 samples of agricultural requirements were analysed in the Agricultural Chemical Laboratory.

It is now established that all stock feed additives must have the approval of the Technical Sub-Committee on Livestock Feed Additives appointed by the Standing Committee on Agriculture before being considered for registration in Queensland.

The recommendation that all plant food nutrients be expressed in terms of elements, accepted by the Australian Agricultural Council, culminated in the proclamation of "The Agricultural Standards (Fertilizer and Lime) Regulations of 1967" which came into force on January 1, 1968.

The first phase of the work undertaken two years ago to develop a list of recommended common names for pesticides in Australia has now been completed by the publication of Australian Standard Recommended Common Names for Pesticides by the Standards Association of Australia. The Standards Branch took an active part in the development of this publication.

Inspection and sampling of seeds, pest destroyers, veterinary medicines, fertilizers, lime and stock foods were carried out in country and metropolitan areas. Action was taken to seize a number of unregistered preparations.

Only a small quantity of produce such as hay and chaff failed to comply with the provisions of the Regulations. This was no doubt due to a great extent to the constant visits paid to produce stores and rail yards.

CHEMICALS DISTRIBUTION

An Agricultural Chemicals Distribution Control Board was formed during the year with the immediate task of developing the provisions of "The Agricultural Chemicals Distribution Control Act of 1966" to a stage where the Act can be proclaimed. Draft regulations have been developed by the Board.

A comprehensive survey of potential hazardous areas has been undertaken. Maps prepared as a result of this survey will show cultivated areas and types of crops grown and will be used in preparing recommendations relating to hazardous areas.

An area for testing the reaction of crop plants to the application of agricultural chemicals at various concentrations is being established.

AGRICULTURAL ENGINEERING

Mechanization costs constitute 30–40% of annual farm operating costs and there has naturally been a heavy demand for advice on the selection and operation of farm machinery in an effort to keep these expenses as low as practicable. Difficulty has been found in providing agricultural engineering services to primary producers and primary producer organizations, while at the same time maintaining a close liaison with machinery manufacturers.

Recently, however, an additional agricultural engineer has been appointed and stationed at Toowoomba to examine farm mechanization problems and to assist in designing experimental machinery. Projects of immediate concern are grain drying, grain ventilation and storage, stubble handling practices and draught of implements under varying soil conditions.

The Primary Industries in 1967-68

LIVESTOCK INDUSTRIES

Slaughterings for beef and veal in 1967-68 increased production by about 3% over that of 1966-67, which was 16·1% lower than that of the previous year. Increased production in 1967-68 resulted largely from increased weights of cattle slaughtered, reflecting the better seasonal conditions.

The beef industry continued to enjoy satisfactory returns from export, particularly to the United States. Japan offers a potentially satisfactory market, which, however, is subject to import quota control. United Kingdom prices improved in comparison with the previous year; this can be attributed to supply difficulties encountered by Argentina. The market outlook, however, is clouded to some extent by the uncertainty of continued entry to the United States and by increasing production in the European Economic Community.

The generally satisfactory seasonal situation in the beef areas was marred during the summer and autumn by the third major epizootic of ephemeral fever in Queensland. In some areas all herds were affected. In the north, practically all cattle were affected but in the south-eastern corner the figure was about 10%. Mortality was low.

The strong demand for store cattle continued, with market values generally being higher per 100 lb. carcass weight than could be realised for the same cattle after fattening. The resulting low profit margin has disrupted some short-term fattening operations. During the winter, some crop fatteners elected to plough out forage crops in order to commence land preparation for cash crops, which they considered to be a more profitable alternative.

The shortage of store cattle is due to a combination of factors, important among which are the effects of several years of drought in causing premature sale of young and breeding stock, and lowered reproductive rates. The major long-term factor is the demand for cattle to stock new and pre-existing holdings on which extensive development is occurring. No marked improvement in store cattle supply can be expected in the near future, and it is evident that greater efforts will have to be made to improve the reproductive performance of beef herds, particularly in the northern regions.

The favourable seasonal conditions over the eastern half of the State have created a strong demand for breeding class cattle. This would suggest an attempt by producers to rebuild herds which were numerically weakened during the 1965 drought.

The 1967-68 Brisbane wool sales opened at average prices sharply down on the previous season. Prices recovered moderately to the end of February 1968 but declined later to below opening sales rates. Generally fine wool realised firm prices. The average price of greasy wool for 1967-68 was 43·50 cents per lb., a fall of 3·43 cents on the level of the previous season. Total sales were 703,867 bales.

DAIRYING

Butter production in 1967-68 was the lowest for 40 years. Estimated at approximately 28,000 tons, this was a fall of almost 15% on 1966-67. Cheese production fell but not to the same extent. Production in Queensland having fallen towards the end of the financial year, it was found necessary to import butter into Queensland to meet local requirements.

In the United Kingdom, the main export market, the Australian Dairy Produce Board was unable to fulfill the agreed basic export quota for the year ended March 31, 1968, of 72,200 tons of butter, and the short-fall was taken up by New Zealand.

Prices realised for Australian butter in the United Kingdom remained unchanged throughout the year at 300 shillings per cwt. Cheese prices, however, fell from 270s. per cwt., which operated at the commencement of the season, to 255s. in March and 225s. in May 1968. With the accumulation of stocks within the E.E.C. and the United Kingdom it is expected the market will become increasingly difficult. Competition for butteroil on other world markets was fierce and uneconomic.

The fourth 5-year Commonwealth Stabilisation Plan, which came into operation on July 1, 1967, includes the main features of the previous plan, continuing subsidy payments on 40% butterfat products at the rate of $27m. per annum, with an annual guaranteed average return of 33·3 cents per lb. commercial butter. The Commonwealth Government continued its support on export of processed milk products to the extent of $800,000 per annum. Assistance is also being offered to individual farmers to assist in the economic amalgamation of farms and evacuation of certain farmers from the industry. The State, through its pasture improvement scheme, which is being readily availed of by dairy farmers, materially assisted in rehabilitating dairy pastures and consequently dairy yields.

The quality of produce as evidenced by official grading results was similar to previous years. A total of 69·75% of butter was submitted for official grading, of which 48·37% was classified as choice grade. The quantity of cheese examined by graders was 53·52% of the total manufacture. Of this quantity, 4·39% was of choice quality and 91·39% of first grade standard.

The total number of dairy farms producing marketable supplies during the year declined to 11,082, a decrease of 8·6% on the previous year's figure. A total of 4,258 suppliers consigned milk for treatment and the remaining 6,824 producers supplied cream only.

Steps towards the centralisation and amalgamation of dairy manufacturing plants were initiated in several centres during the year. The Allora butter factory did not commence operations, the Proston and Miles factories ceased manufacture, the Jandowae cheese factory ceased production and the Millmerran factory announced its intention to cease production. In five regions, local associations conducted negotiations with respect to amalgamation of activities but in only one region, the Western Downs, was any positive action taken.

Expenditure on modernisation of dairy manufacturing premises and equipment has been maintained at a satisfactory level, a total expenditure of $1,425,000 being incurred. Queensland United Foods Ltd. installed an ultra high temperature milk treatment plant in the latter portion of the year. The Logan and Albert Co-operative Association decided to commence casein production; this will bring the number of plants in the State to three.

Installation of bulk milk farm refrigeration and storage units and tanker collection expanded considerably during the year. A fleet of 54 tankers is employed to transport bulk milk supplies. One area, Nambour, was receiving 100% of the milk supply in bulk.

SUGAR

The 1967 sugar crop produced a record 2·213m. tons of sugar from a crushing of 15·7m. tons of cane. The overall average price was $83·36 per ton, compared with $83 per ton in 1966. Sugar within peaks averaged $86, which included $1·81 per ton from Commonwealth loan assistance; the return from excess sugar was $38·55 per ton.

Free-market prices continued at a low level throughout 1967-68, and the London price varied between £16 and £25 per ton. These low prices emphasised once again the benefits the Australian sugar industry derives from the protected markets, the domestic as well as the market assured under the U.K./Commonwealth Sugar Agreement.

The international sphere was marked by the protracted negotiations for a new International Sugar Agreement. The conference called by the United Nations to formulate a new agreement was aimed at raising world prices for sugar traded outside preferential systems above their present depressed levels. At the end of the year the talks, which had been suspended, had produced no satisfactory outcome.

WHEAT

The record 1967 planting of 1·5m. acres of wheat is estimated to have produced about 28m. bus. of wheat, well below the 35·7m. produced in 1966 from a smaller acreage. The average yield, estimated at 18·7 bus. per acre, was more than a third lower than in 1966-67. Unseasonal conditions caused the lower yields and the worst affected areas were the Maranoa, Western Downs and Central Queensland. Grain quality on the whole was good, a high proportion grading "prime hard" and some samples recording up to 20% protein.

The smaller crop eased the pressure on State Wheat Board storages but they are still insufficient to cope with the larger crops now being grown in Queensland.

The 1967-68 crop was the last under the current Wheat Industry Stabilisation Plan. Negotiations for a new 5-year plan to commence with the 1968-69 crop were inaugurated towards the end of the year. The proposals of the Commonwealth Government included some radical differences from the previous four schemes, including a departure from the cost of production formula as used in previous schemes, and the severing of the link between the guaranteed price and the home consumption price.

BARLEY

Barley production from the 1967 crop, estimated at 10m. bus., was some 3m. bus. less than from the 1966 crop. This was the direct result of lower yields per acre.

Receivals by the Barley Marketing Board totalled only 3·8m. bus., as compared with 7·2m. bus. from the previous crop. A disturbing feature was the sudden cessation of deliveries in November, which proved embarrassing to the Board, as forward sales had been based on receivals to that date and expected further receivals. The lower receivals were undoubtedly due to increased interstate grain sales to meet demands from drought-affected areas in New South Wales and Victoria. The extent of these sales outside the Board subsequently intensified the problems affecting the Board's ability to sell forward, and it is regrettable that lack of grower support should adversely affect the future development of the interstate market on an organised basis.

The year was marked by the opening of a new malthouse at Redbank, near Ipswich, and an increase in malting capacity at Toowoomba. These events augur well for the future of barley growing in Queensland, particularly with the prospects of improved returns resulting from lower freight costs.

GRAIN SORGHUM

The 360,000 acre crop is expected to produce over 10m. bus. at an average yield in excess of 29 bus. per acre, the highest since 1959-60 and almost 7 bus. per acre in excess of the 1962-66 average. Continued interest was shown by overseas buyers in Queensland grain sorghum and by the end of the year three cargoes had been sold to Japan. World supplies of grain sorghum and alternative grains improved and this resulted in prices realised for sorghum exports falling considerably below those for the previous crop.

MAIZE

The area planted to maize in 1968 is estimated at 135,000 acres, a decline of some 22,000 acres on 1967. The decline is attributed to a general swing to other crops such as peanuts and grain sorghum and to late planting rains in southern Queensland. Production is estimated at 4·5m. bus. On the Atherton Tableland the outlook for higher yields from rust resistant hybrid varieties is very promising, particularly with the better acceptance by farmers of fertilizer application. Stem and cob rot diseases still remain a problem.

PEANUTS

The peanut industry in Queensland achieved record results in respect of acreage, production and yield during the 1967 season.

Production at 41,098 tons from 69,330 acres planted was substantially in excess of any previous performance and exceeded known domestic market requirements. However, the Peanut Marketing Board was successful in disposing of some 36,000 tons on the local market, leaving a carryover of approximately 5,000 tons to be disposed of during the 1968 selling season.

Seasonal conditions experienced during the 1968 season to the end of June were far from ideal and it is estimated that some 30,000 tons will be harvested from 63,000 acres planted.

NAVY BEANS

Production from the 1967 season amounted to an estimated 1,800 tons from 7,000 acres planted. Heavy unseasonal rains during June materially reduced the size and quality of the later portion of the crop. On the basis of current indications, the 1968 season is expected to surpass previous levels. Some 14,500 acres were planted to yield an estimated harvest of 6,200 tons. A recent survey of the navy bean market in Australia suggests that the domestic market for both canning and culinary purposes now stands at 6,500 tons of cleaned beans. Consequently, production from the 1968 season, estimated at 5,200 tons on a cleaned bean basis, will, for the first time, approach the Australian market's domestic requirments.

TOBACCO LEAF

The Tobacco Industry Stabilisation Scheme, which was originally introduced for a 4-year period from the 1964-65 tobacco season, was extended to 1973-74. It was also announced that the 1969 Australian tobacco leaf marketing quota would be increased from the previous limit of 26m. lb. in 1968 to 28·5m. lb. green weight. The Queensland share of the quota was accordingly increased from 14m. lb. to 15·346m. lb. This increase was allocated by the Tobacco Quota Committee, priority being given to the relief of growers suffering from financial hardship. It is still apparent that even this new State quota will not be sufficient to enable all Queensland growers to be placed on a sound sconomic basis.

In 1967 a total of 14,194,848 lb. of Queensland tobacco leaf was sold at an average price of 109·9 cents per lb., compared with the Australian average price of 110·6 cents per lb. Queensland growers were able to sell more than the State quota of 14m. lb. because of a short fall in northern New South Wales production.

Some 500 tobacco growers in the State experienced hail damage to their 1967-68 crop. The Tobacco Leaf Marketing Board, as a result, prepared a Tobacco Hail Insurance Scheme which is currently being submitted to growers.

COTTON

Due to favourable growing conditions, Australian production of raw cotton in 1968 reached a record level of approximately 149,000 bales (480 lb.), an increase of 65,000 bales on the previous year. Production is now well in excess of Australian spinners' annual requirements for local cotton and export of the surplus of approximately 35,000 bales could be involved. Queensland production is recorded at 17,300 bales, an increase of nearly 4,000 bales on 1967. The expansion in recent years has come primarily from irrigated areas, although success with rain-grown crops has followed skip-row planting.

The present Raw Cotton Bounty Scheme expired with the 1968 harvest. The scheme provided for an annual bounty of $4m. A new scheme is under consideration which, it is anticipated, will accommodate economic production on increased irrigation areas in this State, where the potential of production of cotton free from the micronaire problem is indicated.

Increased production will pose a marketing problem in equalising payments to growers due to the differentials between grades for local and export markets.

OILSEEDS

Soybean production from the 1968 season is currently estimated at 1,700 tons from 4,600 acres planted, and compared with some 400 tons from about 2,900 acres planted in 1967. Production still falls far short of Australian requirements and this is attributed to the unsatisfactory price to farmers.

Safflower seed production from the 1966-67 season amounted to 23,000 tons from 89,000 acres planted. Planting estimates for the 1967-68 season, at 105,000 acres, show a marked increase over that recorded in the previous year. However, generally unfavourable seasonal conditions resulted in much lower yields and it is now estimated that production from the 1967-68 season will amount to 18,000 tons.

Linseed production from the 1966-67 season amounted to 7,300 tons from 17,800 acres planted. Although 1967-68 plantings showed a marked increase at 22,000 acres, generally unfavourable seasonal conditions indicate reduced yields with the resultant harvest now estimated at 6,000 tons.

PINEAPPLES

The pineapple industry recorded a further increase in production in 1967-68 and during the 1968 summer crop faced a situation of crisis. Total production for the year ended June 30 approximated 127,000 tons, an increase of 12% on 1966-67 production. As approximately 40% of the crop is harvested in February/March, canning facilities are often taxed at this time. This year, a record summer crop and unseasonal weather conditions resulted in a very sharp peak in deliveries and, despite a record cannery throughput, the whole of the crop could not be handled. Approximately 3,900 tons had to be destroyed. Fruit dumped will rank for payment with fruit delivered for processing, and the losses will thus be spread over the whole of the industry.

Low returns were aggravated by a downturn in export prices for canned pineapples as well as by the devaluation of sterling and by increases in shipping freights.

The industry considers that production has to be contained if recurring crises are to be avoided. Accordingly, a stabilisation plan based on two pools, one for the Australian market, and one for the export markets, was devised for introduction before the 1969 harvests subject to growers indicating their acceptance of the plan.

CITRUS

In 1968, the citrus crop gave every prospect of moderate production of good sized fruit. Market realisations for navels showed improvement on the previous year.

BANANAS

The banana industry suffered a degree of over-production and, as with pineapples, during the 1968 summer crop period dumpings were necessary. Market prices remained at fairly low levels during the September/March period, with uneconomic returns to growers. Measures to stabilise the banana industry are again being considered. However, prospects of success are less favourable than in the case of the pineapple industry because banana production is not confined to Queensland, and implementation is faced with constitutional difficulties.

APPLES

The Stanthorpe apple industry has not fully recovered from production setbacks of recent years. The 1968 crop is provisionally estimated at 1·2m. bus. compared with an original estimate of about 2m. bus. Exports amounted to 84,000 bus., compared with 50,000 bus. in 1967 and 200,500 bus. in 1966. Not all export quality fruit available was shipped, mainly because of a lack of confidence in overseas markets. It was hoped that a brighter home market would prevail, since crop yields in all mainland States were below normal. However, the cancellation of some 900,000 bus. of export fruit by Tasmania for diversion to the domestic market will, it is anticipated, adversely affect realisations for Stanthorpe apples held in cold store for sale in the later part of 1968.

The progressive increase in orchard size and associated mechanization of harvesting and fruit handling have been accompanied by a continued improvement in cultural practices and increasing use of supplementary irrigation to improve both size and quality of the fruit.

Controlled atmosphere storage, which has been the subject of intensive investigations by Departmental officers, is now being used successfully in Queensland on a commercial scale. This method of storage will help to cope with any expansion in production by increasing the marketing period of apples by several weeks.

GINGER

Plantings for the 1968 ginger crop were estimated at 336 acres, an increase of 60 acres on the previous year. Intake of early harvest ginger for 1966-67, used mainly for confectionery purposes, was about on a par with the 1965-66 intake of 934 tons. However, a big increase in intake of late harvest ginger was anticipated. The late harvest could reach 1,500 tons, compared with 780 tons in 1965-66.

By Authority: S. G. Reid, Government Printer, Brisbane