

Australian Agriculture in the Post War Era

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In accepting this outstanding honour of the Farrer Memorial Medal for 1966, I do so with considerable humility especially when one peruses the list of distinguished scientists who have been recipients in the past years.

I thank you, Mr Chairman and the members of the Trust, for bestowing this honour upon me, and whilst I am the fortunate recipient this year, I feel that the award is a recognition of the work and efforts of that excellent band of scientific and technical officers who constitute the staff of the New South Wales Department of Agriculture and over whom it was my privilege to preside in recent years. My personal contributions to agriculture have been minimal but I did spend thirty-two most enjoyable and interesting years in animal health and production research and perhaps made some slight contribution to knowledge in these fields. During this period, I feel I made many friends amongst professional colleagues and producers, not only in Australia but overseas. I have always found it a most stimulating experience on overseas visits, to renew friendships and participate in discussions especially with colleagues in Britain and the United States.

Tonight we honour the memory of William James Farrer, a dedicated research scientist who has appropriately been described as the "Father of the Australian Wheat Industry". It is not my intention to review the work of William Farrer, this has been done on a number of occasions by previous recipients of the Farrer Medal. Farrer died in 1906 but it was not until thirty years later, 1936, following the creation of the Trust, that the first Farrer Memorial Oration was delivered by the Prime Minister, the Rt. Hon. J.A. Lyons, P.C., M.P. In the course of his address the Prime Minister said "today Farrer's work still goes on; the track he blazed is still opening ahead. Just as he was a pioneer in his young days in surveying the back country and making land available for the settler, so today we are still forging ahead with improved varieties of wheat as well as other crops".

Possibly the greatest tribute paid to William Farrer in recent years has been the reproduction of his image and name together with some ears of wheat, being symbolic of his life work as a wheat breeder, on the reverse side of the Australian two dollar note. It will be observed that there are eleven ears of wheat and I am indebted to Messrs. Walkden Brown and Fitzsimmons (1.) Cereal specialists of the N.S.W. Department of Agriculture, for the identification of the wheat varieties used by the designer of the note. Of the eleven ears depicted from left to right Nos 1, 2, 4, 5, 6, 9, 10 and 11 are Bencubbin, the bearded ear, third from the left, is probably Spica and the two heavily bearded ears towards the right are of a durum or macaroni variety, probably Dural.

In endeavouring to review Australian agriculture in the post-war era I have imposed upon myself a task which cannot be covered completely in the time at my disposal and any attempt to fulfil, this intention could only achieve the conclusion that most of you would be asleep and I would be exhausted. Consequently I will restrict my observations to some of the highlights of the last twenty years and perhaps courageously, predict some possibilities for the future.

In recent years there has been a trend amongst some primary producer organisations to establish conditions aimed at stabilising certain industries and, whilst the merit of this target is understandable, it is difficult to appreciate how this can be achieved. Through the ages primary production has always been attended with risks, which cover such factors as misjudgment of markets resulting from changes in supply and demand, the chances of drought, fire, flood and even theft. Insurance can be effected against some risks but not against price fluctuation. Consequently the risk factor will always remain whatever the field of primary production.

Rural Reconstruction Commission

It will be recalled by those of less tender years that during the last war the Minister for Post War Reconstruction, the late J. B. Chifley, established the Rural Reconstruction Commission. (2.) This took place in February, 1943, and the Commission consisted of four members whose terms of reference were to report to the Minister on the organisation of the Australian rural economy and the effectual prosecution of the war, including the efficiency of methods of production, distribution and marketing of primary products and the conservation, maintenance and development of the natural resources of Australia and of the reorganisation and rehabilitation of the Australian rural economy during the postwar period.

Between January, 1944, and August, 1946, the Commission produced ten reports beginning with a General Rural Survey and followed by a series on almost every aspect of primary production. In their last or tenth report the Commission summarised their conclusions and made recommendations, which incidentally were not unanimous, on the future organisation of Australian agriculture. One member produced a dissenting report from the recommendations on the need for farmer's organisations and the wisdom of stimulating such organisations from outside. To succeed organised bodies are dependent on the energy and interest of members and must grow and evolve if they are to succeed and function to the advantage of their members and their industry. One striking statement in the dissenting report bears quoting in view of its soundness and truth and which has been clearly exemplified during the course of the tragic prevailing drought in New South Wales and Queensland and I quote, "the most urgent need of our time is a reformed education which will produce, first, a larger number of men with both the capacity and the will to serve the community as a whole, and, secondly, a greater capacity on the part of all the producers in an industry to understand the real nature of their problems. This is as true for the satisfactory solution of the agricultural problem as for that of the nation as a whole.

The solution of the problem lies, therefore, not in setting up one more series of organisations which will absorb money and effort but in ensuring a wiser and more effective system of rural education which will enable larger numbers of men to have a broader appreciation of the true problems of the countryside and its industries and to place less reliance on palliatives and temporary expedients which have been costly and barren of lasting results in the past".

Although some twenty years have passed since the publication of this very true and factual statement it still fits the picture of Australian primary industries today and in my view it is unfortunate that more people engaged in primary production do not mould their philosophy accordingly. As mentioned earlier, this statement was made in a dissenting report on the chapter of recommendations by the Commission. In the light of its soundness which recent history has confirmed I extend my congratulations to its author, Sir Samuel Wadham, formerly Dean of the Faculty of Agriculture, University of Melbourne, for his sound perspicacity.

In general the reports of the Rural Reconstruction Commission constitute concise and valuable reference documents on the history of Australian agricultural production and marketing. It is to the second term

of reference that I propose to make a few observations, e. g. the reorganisation and rehabilitation of the Australian rural economy during the postwar period.

In formulating their recommendations for the rehabilitation of the Australian economy in the postwar period happenings of both an internal and external nature could not possibly have been anticipated. Firstly, there has been the establishment of independent States within what was known at the end of the war as the British Empire and which even as early as 1946 became known as the British Commonwealth; then the rapid expansion of the Australian economy from the influx of foreign capital and enhanced values of Australia's primary industry exports; and the relatively rapid increase of population by migration.

There have been large increases in production and changes in demand in many fields of primary production - for example the doubling of wheat production; increased wool cuts resulting from expansion of sown pastures in the higher regular rainfall areas; increased world demand for beef; expansion of the rice industry especially in New South Wales and more recently on the Ord River, Western Australia; the development of the cotton industry again in New South Wales and on the Ord; and the opening up and settlement of new country in all States, especially Esperance in Western Australia, the Wimmera in Victoria, the north-west and north-east coasts of Tasmania, and, more recently, the brigalow and areas suited to tropical pastures in Queensland. Such happenings could not possibly have been contemplated over twenty years ago.

As a producer of foodstuffs in excess of our requirements international trade is of paramount importance to Australia and here trade agreements with countries both within and outside the British Commonwealth have great significance. The proceedings of the organisation known as GATT (General Agreement on Tariffs and Trade), of which Australia is a member, are of interest to Australian primary producers. Whilst the rate of flow in decision-making from GATT is not rapid, it can at least be reported to be moving. The same may also be said of Codex Alimentarius, another international body carrying the U.N. blessing, of which Australia is a member. The question is often asked "what does Codex Alimentarius do?" One aim of this body is to endeavour to arrive at a system of standards for foodstuffs, notably preserved foods. As an example, canners operating on the export market encounter many difficulties in meeting the requirements of importing countries. As an instance there is a wide range of requirements as to the sugar content in the syrup of canned peaches,

varying from 12 percent to 25 percent. These requirements are obligatory or the business is lost. It is on matters of this type and many others that Codex Alimentarius is endeavouring to arrive at a level of mutually acceptable uniformity, all of which must have an effect on the ultimate price of the food to the consumer.

In considering the recommendations of the Rural Reconstruction Commission under their second term of reference two interesting features stand out. Firstly, it may be remembered that during the war a system of committees known as the War Agricultural Committees were established throughout the rural areas of the Commonwealth. These Committees played a vital role during the war years in organising manpower and assisting in the distribution of commodities in limited supply such as machinery, fertiliser, electricity, fencing wire, tyres and other numerous items. The Commission felt that these Committees would form the nuclei in the postwar years for the creation of a national organisation of agriculture and provided what was virtually a master plan for such an organisation. This never eventuated and the Committees wound up after the cessation of hostilities.

The second matter I wish to mention is the omission in the recommendations of the need for agricultural extension services per se in the post-war plans. Possibly it was considered that this requirement would be met by the proposed Regional Councils which were to succeed the War Agricultural Committees. Over the last two decades there has been a significant expansion in the provision for agricultural extension services in all States. The incentive to this project has been the provision of funds by the Commonwealth Government to the States to supplement State budgets in augmenting these services. These funds, known as the Agricultural Extension Grant and the Dairy Industry Extension Grant, have made a valuable contribution towards the work of the States in the extension field.

Another development in the extension field has been the establishment of Farm Management Clubs especially in the States of New South Wales, South Australia and Western Australia. The Clubs are formed by groups of approximately thirty farmers who contribute an annual fee to engage an experienced agriculturist who visits their properties regularly and gives advice on their problems. Whilst Director-General in New South Wales I was always a protagonist for this scheme as I considered that irrespective of the volume of funds available to State Departments for

extension, Australia is a large continent and could never be covered completely by departmental extension officers. Further, it was an example of self-help, philosophy always worth encouraging. In New South Wales the departmental extension officers co-operate fully with farm management consultants and vice versa and the latter are invited to attend schools held periodically on various aspects of extension work. Further reference to agricultural extension work will be made later.

At this stage we might briefly consider the trend of events since the war in some of our major primary industries.

Wool

For many years Australia's greatest export earner has been wool. During the war Australian wool was disposed of under what was known as the Empire Wool Disposals Plan. This was an acquisition scheme similar to that which came into operation in 1916 during World War I and which subsequently went out of existence and was wound up by what was known as Bawra (the British Australian Wool Realisation Association Ltd.) The Empire Wool Disposals Plan, which operated from 1939 throughout the war years, assured a market for Australian wool in the United Kingdom and allied countries and prevented this essential wartime commodity reaching the enemy. The postwar era has seen a remarkable expansion in flock numbers. During this period sheep numbers passed 100,000,000 and at the end of 1964 had exceeded 150,000,000, with half the sheep of the Commonwealth located in New South Wales.

It is of interest to note that in the 1939 selling season greasy wool averaged just under 9 cents per lb whereas the average has been 50 cents this season. Probably the most remarkable event in the history of wool in Australia occurred during the selling season of 1950 when wool at auction went to astronomical heights. This continued during 1951 and tapered off during 1952. Values for all lines skyrocketed, particularly apparel wools, which realised over 200 cents per lb. A number of factors were responsible; British and European manufacturers found themselves faced with substantial orders and the raw product in short supply as a result of the conclusion of the Empire Wool Disposals Plan. In addition the United States was involved in heavy military commitments with the Korean War. This resulted in a remarkable level of prosperity amongst wool growers. The total value of the Australian clip exceeded \$1200,000,000 or £600,000,000 in our former currency. Sheep values were substantially enhanced and much cereal growing country reverted to pasture. Whilst

sheep numbers throughout the Commonwealth have continued to rise, wool values have shown some degree of fluctuation.

Wheat

During the war years wheat acreages were restricted and growers operated under a license. This was a recommendation by the Standing Committee of Agriculture to the Australian Agricultural Council which adopted the proposal. I could never agree with this decision as wheat is the ideal fodder reserve and the cheapest in food value and that knowledge is not recent.

As with wool, wheat has appreciated significantly in value since the war years. The price to the grower in Australia is fixed on a cost of production survey undertaken every three years by the Bureau of Agricultural Economics. It is not proposed to give details of the formula used in these surveys but the popularity of wheat growing in recent years would suggest that given adequate seasonal conditions and a good harvest, wheat growing is quite profitable. The most notable changes in this industry during the postwar era have been firstly the extension of wheat growing into the lower rainfall areas due principally to the breeding of improved varieties - secondly the demand from millers for premium wheats, that is a higher gluten content - thirdly the demand for durum wheats for macaroni manufacture arising from the influx of Europeans - and fourthly, mechanisation of the industry - tractors and the change from bagging the grain to bulk handling. On delivery to silos the grain becomes the property of the Australian Wheat Board who pay the growers and are responsible for selling the harvest. In recent years the Board has disposed of substantial quantities to the U.S.S.R. and the Federal Peoples Republic of China. There are indications that this market may exist for some time. From 1950 to 1964-65 the yield from Australian harvests fluctuated. Western Australia for the first time in its history exceeded 100 million bushels in 1965. New South Wales from 1962 had three successive harvests of over 100 million bushels with highest 151 million in 1964 and a yield of 25.3 bushels per acre, the highest on record. The effect of the drought in 1965 was to reduce the yield to 8 bushels per acre.

Dairy industry

For nearly fifty years the Australian dairy industry has been dependent on a home-consumption price. Some seven years ago the

Commonwealth Government appointed a Committee of five presided over by Sir Mortimer McCarthy to investigate the Australian Dairy Industry and report to the Minister for Primary Industry. Since the war there have been definite changes in the pattern of dairy production throughout the Commonwealth. In New South Wales the numbers of producers in the Central and North Coast areas are declining, and similar changes are apparent on the Atherton tablelands of Queensland. These traditionally have been butter producing areas. Victoria continues to be the leading dairying state and the industry is expanding in north-west Tasmania and the south western irrigation areas of New South Wales. The export of butter oil from Tasmania to south-east Asia has developed. The change in the dietary habits of many Asian countries, especially Japan, has created an export market for milk powder and advances in the technology of dairy products in recent years has provided an opportunity for Australia to compete in these markets. The domestic icecream market continues to expand.

It is evident that the industry has its problems. The whole milk producer enjoys a level of prosperity considerably above that of the butter producer which has created a cleavage in the industry between the two types of producers and it would seem that some adjustment of values on cream producing farms must be undertaken. The prices being asked for these properties today are uneconomic to the purchaser. Another significant factor which presents a challenge to the butter producer is the great advance which chemists have made in the production of hydrolysed oils as table margarine. It is unrealistic to disregard the popular demand for this product, which has been given additional stimulus in the controversy on the etiology of coronary embolism in man. The production of margarine is controlled on a quota basis in each State, licences to manufacture having a tenure of one year. The validity of this quota legislation in one State is at present being challenged before the Privy Council and any discussion at this time is inappropriate, but one might make the observation that substantial quantities of vegetable oils will become available resulting from the rapid expansion of the cotton and safflower industries. Cheese production has expanded notably in the cottage cheese varieties, European migration being responsible. There is still, however, opportunity for further expansion as Australia imported cheese to the value of over \$2 million last year.

Meat

The increase in livestock numbers in the postwar era has naturally lead to an increase in the volume of meat being processed through Australian abattoirs. In New South Wales particularly, country killing has expanded markedly, a number of modern units having been constructed in several districts under Local Government control, by means of long term government loans. The establishment of an abattoir at Katherine in the Northern Territory has provided a wonderful outlet to stock owners. Beef roads also have provided a long overdue facility enabling finished stock to be transported by vehicle and processed in good condition as distinct from the previous system of walking hundreds of miles to market.

Another spectacular development in the Australian meat industry has been the marketing of boneless meat, both beef and mutton, and the very good market for this product in the United States and some European countries. The principal reasons which have contributed to this development have been -

1. The world shortage of protein of animal origin notably beef;
2. The improvement in the standard of living of meat exporting South American countries, thereby restricting the quantity available for export;
3. The price factor;
4. The freedom of Australia from Foot and Mouth Disease.

This latter factor is of particular importance to the United States trade. Foot and Mouth Disease virus can persist in frozen fresh meat and United States Quarantine authorities wisely will not sanction the entry of any fresh meat from countries where the disease occurs. It has cost the United States Government millions of dollars to eradicate the disease from the North American continent and every safeguard is applied to preclude its re-entry. Thus the importance of maintaining Australia as a Foot and Mouth disease-free continent becomes paramount. If by any chance the disease gained entry to our herds and flocks, Australia overnight would be severed from a meat market which

in recent years has returned over \$200,000,000 per annum and the United States would lose a relatively cheap source of meat for her processed foods, so widely consumed by a large component of the American population.

Lamb production continues to rise as has the domestic consumption which has been influenced by the price factor in contrast with beef. This has reduced the volume of prime lamb available for export to London.

There are movements in the development of northern Australia for beef production and there is little doubt that this potential exists but it is of interest to record that the target for increased beef production, to meet our commitments under the post-war Fifteen Year Meat Agreement with the United Kingdom, was obtained from the more closely settled eastern states.

Fruit

The post-war era has seen a marked expansion in fruit growing throughout the Commonwealth, the citrus industry being a striking example where production had doubled in the States of New South Wales, Victoria and South Australia. The development of an export market for citrus in New Zealand has been affected by the presence of Queensland fruit fly in New South Wales and Mediterranean fruit fly in Western and South Australia. The efficacy of ethylene dibromide treatment for fruit fly in oranges has satisfied New Zealand quarantine authorities and shipments of oranges are now being received. There have been some fluctuations in the fortunes of the banana industry on the north coast of New South Wales attributable in some degree to over production. The pome fruits (apples and pears) have not only regained their pre-war overseas markets, but have expanded into new fields. The Tasmanian apple industry especially in the Huon Valley has increased production and developed their packaging and handling processes, notably the cardboard carton cell pack which almost eliminates bruising.

Plantings of wine grapes have shown a progressive expansion over the last twenty years, the particular areas being the Barossa Valley of South Australia and the Murrumbidgee Irrigation Area of New South Wales. Accompanying this expansion there has been the improvement in the quality of Australian table wines as evidenced by their popularity. Speaking from experience overseas I would assume that the best lines are

marketed in Australia and not exported, except to Australian embassies.

Rice

Prior to World War II, rice growing in Australia was in its infancy, but during the war years, the loss of production areas in South-East Asia necessitated Australia expanding her rice production. This took place within the Murrumbidgee Irrigation System. Seed rice was introduced from the United States and grown in quarantine under close supervision for evidence of disease. The wisdom of this precaution has been amply justified as subsequent experience has shown that Australian rice is remarkably free of disease and giving the highest yields of any rice in the world. The varieties grown in New South Wales are upland varieties, notably Caloro, whereas lowland varieties are grown in South-East Asia, yield of which is half that of New South Wales. The limiting factor in rice growing in the M.I.A. has been the availability of water through which the crop is grown until it matures. On this account, each grower is permitted a restricted acreage which has varied over the years from 60 to 80 acres and is highly profitable. A further factor necessitating restricted acreages, has been the raising of the water table resulting from prolonged submersion of the country and the harmful effect on many orchards within this area. With the development of irrigation from the Bandycoot Dam on the Ord River in north western Australia, rice growing has shown considerable potential.

The New South Wales Department of Agriculture has had an expansive plant breeding programme with rice at the Yanco Research Station. One object of this programme is to breed a high yielding long grain variety which is in great demand and has previously eluded rice breeders throughout the world. Recently D. McDonald, a plant breeder of the New South Wales Department of Agriculture at Yanco, has produced a long-grained variety yielding up to 4.67 tons to the acre, which is substantially in excess of the yield of the short-grained varieties which already have given world record yields on New South Wales rice farms. The rice crop in New South Wales is disposed of by a Rice Marketing Board which over the years has been very successful in disposing of the crop at profitable prices. They are meeting the entire rice requirements of Papua-New Guinea and many Pacific Islands.

Cotton

It is doubtful if, in the history of Australian agriculture, whether any crop has been associated with such a spectacular advent and expanded with greater speed. From a mere embryo in 1961, it is today a lusty adult with a voice of considerable magnitude and carrying capacity. The major centre is in the Narrabri - Wee Waa area of New South Wales. A number of crops have also been sown in the Riverina. The Ord River in Western Australia has also attracted a number of growers. The climate of this area is very favourable, being completely frost free. It would seem, however, that cotton production on the Ord is not without its problems notably the control of some species of indigenous insects which attack and exercise a highly destructive effect on the growing plant. As in the case of rice, Australian quarantine authorities have insisted that all introduced cotton seed must be grown in quarantine - a wise safeguard in excluding exotic diseases of cotton. For some six years the New South Wales Department of Agriculture has developed a small cotton research station at Narrabri and has sent two officers to the United States for experience with cotton. Irrigation and freedom from frost during the growing period are vital for the crop to succeed. Yields have been satisfactory, in some instances up to 2,500 and 3,000 lbs per acre while quality and length of fibre have been good and suitable to the requirements of manufacturers.

At present cotton is carrying a bounty from the Commonwealth, of 12 cents per lb. This is subject to review and will doubtless receive consideration in the light of production meeting Australia's cotton requirements in the not far distant future. Any reliance on returns from export would be attended with problems.

Poultry Industry

For some years Australia has had a large surplus of eggs in shell for export, London being the traditional market. With the expansion of the poultry industry in Britain over the last twenty years, the country's requirements for eggs in shell have been satisfied from domestic production. The export marketing of Australia's egg surplus both in shell and as pulp has been handled by the Australian Egg Board in all States except New South Wales where the Egg Board of that State has operated independently and at times in competition for markets with the Australian Board, but it must be pointed out that half the poultry population of the Commonwealth is located in New South Wales. In 1962

the 12th World Poultry Congress was held in Sydney and one fact which emerged was that the world was 25 percent over-produced in eggs. In Australia this has had the effect of many small producers leaving the industry as the profit margin has declined.

Probably the most spectacular development in the history of the poultry industry in Australia has been the expansion in broiler production. Some ten years ago New South Wales produced between 4 to 5 million broilers. This year production is expected to reach 40 million. The quality is good and birds of marketable weights, 3 lb to 3½ lb, are being attained in approximately ten weeks. An export trade to neighbouring countries of the Pacific area has developed and can be expected to increase. The birds are processed, packaged and marketed in accordance with modern knowledge and techniques. In the early 1950's pressures were exerted to permit the introduction of United States strains of meat birds either as live birds or hatching eggs. This was resisted and finally refused by the Commonwealth Department of Health, which is responsible for quarantine in human, animal and plant matters, on account of the risk of introducing Newcastle Disease or Fowl Pest. The prohibition on the introduction of poultry from all countries other than New Zealand has operated since 1946. Pure breeds of what are basically meat birds were already in Australia and producers, with the assistance of competent geneticists and the application of genetic knowledge, are now marketing a meat chicken which is not far behind the meat birds of the United States and Great Britain.

Tobacco

Tobacco growing in Australia has been an avenue of primary production associated with hazards and risks. The bulk of the tobacco market has been supplied for years by tobacco and cigarettes manufactured in Australia with a high proportion of imported leaf. For years tobacco growing has been undertaken in North Queensland notably Mareeba, in Victoria, the border districts of New South Wales adjoining Queensland and Victoria and in Western Australia. In 1937 in the interests of growers, the Commonwealth Government set up the Central Tobacco Advisory Committee which still functions. The crop is disposed of by auction and in the late 1950's attained price levels which attracted many growers to the industry resulting in the offering of a crop much in excess of manufacturers' requirements.

A series of crises between the growers, manufacturers and the Commonwealth Government have occurred in recent years until in 1966 we find that tobacco growing has ceased completely in Western Australia. Australian grown leaf offered at auction must not exceed 26,000,000 lbs and the manufactured product must carry a component of 41 percent domestic leaf. The percentage of Australian or domestic leaf in cigarettes is fixed annually by the Australian Agricultural Council and over the years has risen from less than 5 percent to the present level. As manufactured tobacco carries an excise duty manufacturers must comply with this requirement to obtain a rebate of duty paid on imported leaf.

Research

At this stage some consideration might be given to the developments in agricultural research in recent years, during which there has been greatly increased productivity in the primary industries which have played such a significant part in the expansion of the gross national product and raising of the economy. Except for a prolonged drought in Central Australia, a succession of good seasons since 1947 and almost total elimination of the rabbit have been contributing factors. Collaterally the application of the results of research, and the considerable funds available from statutory levy schemes and their impact in augmenting the volume of research, have assisted significantly. Donaldson (1964) (3.) has published an informative article on industry levies for research, but I feel a brief review would be appropriate here. The industry levy schemes are used to finance research in C.S.I.R.O., the State Departments of Agriculture and Universities.

Actually the first legislation imposing a levy on produce to raise funds specifically for research purposes was passed by the South Australian legislature in 1921. This was the Dairy Cattle Improvement Act which was used to finance early research work in the South Australian Department of Agriculture. The statutory levy schemes operating under Commonwealth legislation have been established since 1955, the first being the tobacco Industry Trust Account managed by the Central Tobacco Advisory Committee. In addition each tobacco producing state has an Advisory Committee constituted by representatives of growers, manufacturers and respective Departments of Agriculture, who indicate major problems in the industry and plan research programmes. The Trust Account was initiated by contributions of \$168,000 each from the Commonwealth Government and

the manufacturers. There are annual payments of \$72,000 from the Commonwealth and \$30,000 by each of the four States in which tobacco is grown. Manufacturers are levied at 1 cent per lb on all leaf purchased and growers half cent per lb on all leaf sold. The Wool Research Committee is responsible to the Australian Wool Board. Income is derived from a levy on producers of each bale of wool sold with matching contributions from the Commonwealth. This amounts to over six million dollars per annum and has by far the highest revenue of the industry levy funds. Allocations of money by the Committee are subject to the approval of the Minister for Primary Industry.

The Wheat Research Trust Account is managed rather differently. Growers are levied one farthing per bushel on all wheat delivered to the Australian Wheat Board. In each State except Tasmania, which is not a wheat exporting State, the allocation to research is made by a Wheat Research Committee of the growers money collected in the particular State. The Commonwealth contribution which is not specifically defined in the Act, but has so far been on a dollar for dollar basis, is allocated by the Wheat Research Council on which C.S.I.R.O., the Universities, the Australian Wheat Board and the five States are represented and presided over by a senior officer of the Department of Primary Industry.

The Dairy Produce Research Committee was established in 1958 to advise the Australian Dairy Produce Board on the expenditure of funds in dairy research collected by a levy of one-sixteenth of a cent per per pound of butter and one-thirty second of a cent per pound of cheese paid by dairy farmers on all butter and cheese produced in Australia.

The Australian Cattle and Beef Research Committee came into operation in 1961 and was brought under the control of the Australian Meat Board in 1964. The funds allocated by this Committee to research in beef cattle are obtained by a levy of twenty cents imposed on all cattle slaughtered for human consumption, with a dressed weight of 200 or more pounds. With matching contribution from the Commonwealth on a dollar for dollar basis. Late in 1965, this Act was amended to incorporate mutton and lamb and in March last the Cattle and Beef Research Committee was reconstituted to become the Meat Research Committee. The Commonwealth is also assisting research in the honey and banana industries on a matching basis with respective industry organisations.

Results of research

It is not possible in the time available to present adequately the value of these research funds to the primary industries of the Commonwealth. Significant contributions have been the response of granitic and calcareous soils to copper and molybdenum application. The cobalt story in South and Western Australia, the place of Townsville lucerne, glycine and other legumes in the establishment of tropical pastures.

The great decline in the incidence of Contagious Pleuro Pneumonia of cattle has been an advance of the greatest importance to the cattle industries of the Commonwealth. This has been achieved following the application of a vaccination programme to cattle in the enzootic areas of northern Australia and has been financed by contributions from C.S.I.R.O. and all States except Tasmania. The plan had its genesis at the Biennial Veterinary Conference, which is a permanent committee of the Standing Committee of Agriculture. The Author was Mr D.A. Gill formerly Chief of the Division of Animal Health, C.S.I.R.O. The Agricultural Council approved the plan and in 1960 the programme became operative, the success of which is apparent today. An unexpected outbreak of Pleuro Pneumonia occurred in the Wilsons Promontory area of Victoria in 1965, the origin of which is still a mystery and may have been introduced by a carrier animal in a mob on agistment from the drought stricken areas of northern Australia. Prior to this, the States of New South Wales, Victoria and South Australia had been free of the disease for nine years. Extensive areas of Central Australia have also been free for some years, in fact the only areas of infection are some properties in the north-west of Western Australia the north of Queensland and the top portion of the Northern Territory. It would seem that the time is not far distant when it can be claimed that Australia is a Pleuro-free continent. The benefits accruing to such a situation are inestimable and would enhance the export trade in stud cattle enormously and open the door to many countries notably United States and New Zealand which today are closed to Australian cattle on account of the presence of Pleuro Pneumonia in Australia.

The other major problem of the cattle industry is the Cattle Tick which some years ago was assessed as costing the State of Queensland alone \$20 million. In New South Wales the north-east corner is infested and the parasite has been held there for over fifty years. Several attempts at eradication have been attempted without success and

today the control and research programmes are costing over \$2 million per annum and it would seem this will continue, until more efficient and more lasting acaracides are formulated. The tick proved highly susceptible to organophosphates and carbamates and the charging of dips with formulations of these compounds appeared most effective, but within a matter of months, the tick has developed tolerance to both groups of compounds.

Many projects in beef cattle research are being assisted from the Beef Cattle Fund not the least of which is capital for building the new Meat Research Laboratory for C.S.I.R.O. Division of Food Prdservation in Brisbane.

Wool funds have assisted research in sheep genetics, nutrition, disease control and much of the textile research in wool processing and treatments aimed at improving the competitive position of wool in relation to synthetic fibres.

Wheat research funds have been utilised in wheat breeding programmes, soil fertility studies and capital expenditure on wheat research stations. The rapidity with which rust adapts itself to attacking new rust resistant varieties of wheat means in effect that wheat breeding will continue as long as man eats bread.

The foregoing represents only a very small proportion of the research programmes supported by industry funds.

Quarantine

I would like at this stage to refer briefly to Australian quarantine which, whether it be human, animal or plant, is the responsibility of the Commonwealth Department of Health and who in turn have delegated authority to the States to implement the Commonwealth policy. There is no doubt that the rigidity of Australian quarantine has paid handsome dividends over the years. At times people may feel frustrated and statements appear from time to time criticising the system. It is unfortunate that some opinions emanate from people from whom one would have expected a little more discretion. This undoubtedly acts as an incentive to misguided judgments who constantly endeavour to circumvent quarantine regulations. When a country is free of a disease, it is only possible to prescribe regulations to preserve the situation, in the light of existing knowledge.

The introduction of Blue Tongue disease of sheep would have catastrophic results to the sheep and wool industry and in consequence the national economy. This is a virus disease transmitted by a sand fly vector of which we have numerous species in Australia. It is difficult at times to follow the thinking of some people, who in all seriousness deplored the fact that specimens from suspect cattle in Queensland last December, had to be sent to South Africa for laboratory examination for the possible presence of Blue Tongue virus. Whilst South Africa is prepared to collaborate may this practice continue. We do not want Blue Tongue virus in this country even under laboratory conditions of maximum security. It has even been suggested that this work might be undertaken on an island off the Australian coast. This, I feel, would require to be very distant from the Australian coast, which perusal of an atlas does not reveal.

Our freedom from many exotic diseases can be attributed to our remoteness. The prohibition on the importation of poultry and hatching eggs and all ruminant animals, also the importation of all animals by air have assisted in maintaining our freedom from many animal exotic diseases. The success of the Australian rice industry and more recently cotton are examples of the value of our plant quarantine.

Recent history would suggest that it is exotic virus diseases which are our greatest threat and expansion for facilities for the study of viruses must be of high priority. It is gratifying to record that this requirement is being recognised at Commonwealth and State levels. Four exotic animal diseases have occurred in Australia in recent years. Equine Infectious Anaemia in central Queensland, Infectious Rhinitis of Swine in South Australia, Swine Fever in New South Wales and in 1966 Newcastle Disease of poultry. The last condition fortunately is in a very mild form and not affecting production and possible will be found to be the American Vaccine strain of Newcastle Disease. It would appear that someone has circumvented quarantine and introduced hatching eggs from overseas.

Weather modification

I feel that any attempted review of Australian agriculture in the post-war era would be incomplete without some reference to what might be described as our most recent activity in what is becoming known as "weather modification" and formerly described as rain making.

The pioneers of this science in Australia are a team headed by Dr E. G. Bowen, C.S.I.R.O., Chief of the Division of Radiophysics. This science has already achieved success in the disperion of supercooled fogs at airports, the suppression of hail, and increasing precipitation by seeding with silver iodide the base of cumulus clouds by means of aircraft. C.S.I.R.O. has undertaken an extensive research programme in this field and as a result of the prevailing disastrous drought, the New South Wales Department of Agriculture, in co-operation with Dr Bowen commenced a programme of cloud seeding in the Riverina with an aircraft based on Wagga in the winter of 1965. The results indicated that provided the right type of cloud existed, namely at approximately 19,000 ft and below freezing point, rain could be induced. Rain cannot be induced in clouds of maritime origin i. e. arising over the sea, which are too warm. In August, 1965 rain was recorded on twenty-four days in Wagga for a total of 420 points, which contributed materially in producing a fairly good harvest in that part of the State. Cloud seeding operations are in progress in northern and western New South Wales with some success but unfortunately cloudless periods have prevailed too often. Weather modification research is being undertaken in many countries and a most comprehensive programme, sponsored by the United States Treasury, is being undertaken by the National Science Foundation of that country.

Conclusion

I have attempted to give a summary of some of the major developments in Australia's primary industries since the termination of World War II. Farming today is completely mechanised, the horse as a method of traction has gone, but continues to flourish for racing and recreational purposes. The use of aircraft is increasing particularly in the application of fertilizers and crop dusting, and has reached the stage where State legislation is appearing to meet the need of this expanding industry.

Over the last twenty years primary producers in Australia, with few exceptions, have experienced a succession of good seasons, and with the almost total elimination of the rabbit from myxomatosis, have enhanced production beyond expectations. With a return to the weather pattern, up to 1964 there are favourable prospects for the future. Further areas will come under irrigation and new country such as the Brigalow in Queensland will come into production. Brigalow is a legume, so it might be anticipated that in the early years of its

development the returns from this country might be substantial. The future for wheat seems particularly bright, the Australian Wheat Board having established good export markets. Beef prospects also are good provided we continue to exclude exotic diseases of cattle.

We continue to sell every wool fibre we grow and this situation looks like continuing. The industry, however, fully appreciates the existing challenge from synthetics. Perhaps this appreciation was a little slow to develop in the post-war years, due to the level of prosperity which prevailed in the industry. Wool promotion by the International Wool Secretariat is assisting in maintaining the image of wool popularity in the highly developed countries, but for years I have not been a supporter of Australia's ban on the export of Merinos. This is not making any contribution to maintaining the popularity of apparel wool, which is so important to the industry.

At times one hears criticism from research workers in the sheep and wool field that breeders are not adopting research findings. From many years knowledge and association with sheep breeders, I do not subscribe to this criticism. Stud breeders do not advertise what they are doing; they are in a highly competitive market and great credit is due to them for what they have achieved with Australian Merinos by mass selection methods. The same might be said of Dorset Horn breeders, the Australian strain being a far better animal than the same breed in Britain.

Some semblance of a competitive threat has appeared on the horizon of the butter producer. As mentioned earlier, margarine is manufactured on a quota licence basis in all States. This is being subjected to challenge in one State before the Privy Council.

Prospects for mutton and lamb appear good whilst pork and bacon have never greatly exceeded the requirements of the home market. The Queensland sugar industry is not enjoying its customary level of prosperity. Drought and depressed world prices tend to cloud future prospects.

One development which can be forecast for the immediate future is an expansion of extension services. Over the next five years

funds amounting to \$1 million this financial year and progressively increasing up to \$10 million over the next five years are to be made available by the Commonwealth Government to the States for extension and regional research. Trained personnel to fulfil this expanded programme are in short supply and the agricultural faculties are not attracting students in sufficient numbers. Faculties of Veterinary Science are full but, except for Sydney and Melbourne, the agricultural faculties in other Australian Universities have vacancies for students, in some cases too many.

In this discourse, I have endeavoured to present a few of the outstanding developments in Australia's primary industries since World War II, many of which could not possibly have been predicted by the Rural Reconstruction Commission. Changes in the course of world events as the departure of the Dutch from Java and the creation of Indonesia, the rapid rehabilitation and expansion of Japan, the establishment of the Peoples Federal Republic of China and the dismemberment of the former British Empire were beyond the realms of possibility twenty years ago.

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