

AGRICULTURE and the UNITED NATIONS

By R. J. NOBLE, C.B.E., B.Sc.Agr., M.Sc., Ph.D.*

Today we honour the memory of William James Farrer for the magnificent contribution he made to the welfare of Australia. Year by year, at these annual congresses, reference has been made to one aspect or another of his work, for few men have ever made such a dramatic change in the supply of the basic foodstuff of a nation. It is clearly evident that he was appalled by the ravages of rust in wheat and of drought in a land still so frequently compelled to import wheat to meet deficiencies in its own domestic production.

As we know so well, his self appointed task of wheat improvement, based on principles which he established for himself, was so successful that it completely changed our pattern of wheat production. Spectacular as was his success in expanding the wheat area and the yield per acre, it is clear that, throughout, his ultimate aim was to combine high yield and high quality in wheat in spite of the hazards to which it might be exposed during the course of its production.

There can be no doubt that Farrer would have been delighted with the success of those who have followed him and who have given us our present knowledge of the rust disease complex; and he would have acclaimed the plant breeders' success in the never ending battle with rust. Especially, also, would he have been interested in the achievements which have combined high yield and high quality in individual varieties, and—not least of all, would he have been interested in the discussions which are taking place today in respect of such varieties and their relation to the Australian crop as a whole.

Production and Higher Living Standards

Farrer was a practical humanitarian. He knew that high yielding capacity in varieties meant their acceptance by farmers, but he knew equally well that if such wheats were of high quality also for milling and baking, there would result the general production of

a loaf of higher nutritive value. The ready availability of such a product meant a higher standard of living. Such were Farrer's ideals that one cannot but believe that had he lived in a troubled world—which had just endured the tragedies of two world wars within the space of a generation—he would have agreed with the principles of the United Nations Organisation and especially those of the Food and Agriculture Organisation. These principles were designed to promote world peace through international co-operation in promoting higher living standards.

Perhaps one should not speculate too widely, but one might reasonably assume that he would have been delighted to have been present at meetings or conferences of members of the Agricultural Bureau of New South Wales, an organisation which for almost fifty years has had as its objective "Better farming, better business and better living".

Surely there can be no more important objective than the promotion of world peace on a proper continuing basis through promotion of "better living" for the peoples of the world.

A New Approach

Time and time again, in the years that have elapsed since the last world war, we have been warned by leaders of governments, by scientists, by philosophers, by distinguished members of the armed forces of the last war, and by writers and by leaders of thought in many communities throughout the world that a new approach to world

* Formerly Under Secretary and Director, New South Wales Department of Agriculture.

1959
*Farrer Memorial
 Oration . . .*

problems is required if civilisation is to save itself from utter destruction.

A new approach to world problems has been devised through an inter-governmental body—the United Nations Organisation. Its purpose is outlined in the preamble to its Charter and reads, in part, as follows:

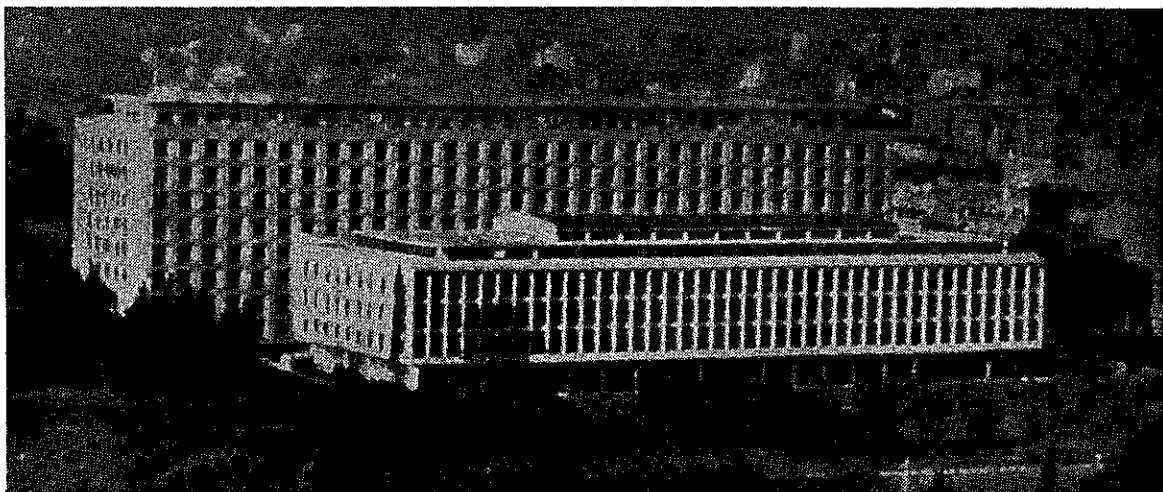
We the Peoples of the United Nations are Determined—

- ...to save succeeding generations from the scourge of war....
- ...to establish conditions under which justice and respect for the obligations arising from treaties and other sources of international law can be maintained and
- ...to promote social progress and better standards of life in larger freedom
- ...to practice tolerance and live together in peace as good neighbours and

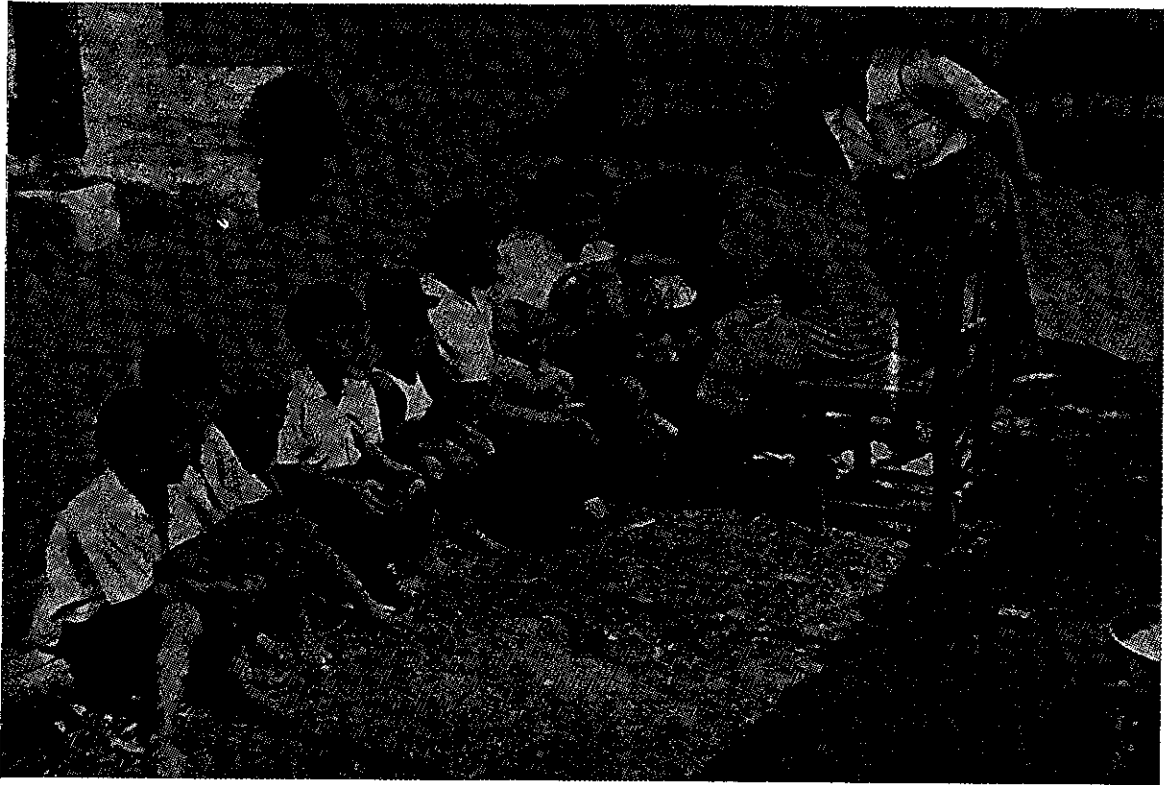
...to unite our strength to maintain international peace

...to employ international machinery for the promotion of the economic and social advancement of all peoples and *have resolved to combine our efforts to accomplish these aims.*

THE FARRER MEMORIAL MEDAL is awarded annually to commemorate the work of Australia's great wheat breeder, William James Farrer, and to mark distinguished service to agricultural science. The oration by the recipient is an important item on the programme of the congress of the New South Wales Agricultural Bureau at which the award is made.



Headquarters of the Food and Agriculture Organisation of the United Nations, Rome, Italy.



Fundamental survey work is essential when the implementation of FAO's nutrition programmes are under way. In this illustration a regional nutrition officer is examining children in a Thai village.

It will be observed that these responsibilities, are accepted by "the peoples of the United Nations" and, further, that special emphasis is placed on the promotion of individual welfare as a basis for the promotion of world peace.

The Food and Agriculture Organisation is an agency of the United Nations Organisation and it so happens, not inappropriately, that it was the first of all agencies to come into being. In fact it was established before the United Nations Organisation itself. Its purpose, briefly stated, is to promote through international co-operation, higher standards of nutrition and higher standards of living by promoting efficiency in the production, the distribution and the use of the products of the farms, fisheries and forests of the world.

Is this statement outlining a new approach merely the statement of an ideal which cannot be realised? If there is increased efficiency in production will this not lead to still further production and still further difficulties in disposal on world markets?

The problems of surplus disposal are serious enough today in spite of all the attention and all the examination that they are receiving almost continuously by governments individually and in consultation with one another at the international level.

At the same time we are aware that "inadequate and unbalanced diets are still the common lot of more than half the world's population". The surpluses that concern us are surpluses only because of the lack of purchasing power on the world's markets. Many nations are short of food but lack the funds to buy it. The promotion of economic development on a world basis is the essence of the problem. If we believe that this is so, the question is what are we prepared to do in our own interests, and in the interests of all, to help in the development of a solution.

If the new approach is unrealistic and impracticable what is suggested as an alternative? If there is no suitable alternative surely it is incumbent on us all to support



Farmers in Afghanistan being taught to harvest their crops with a scythe. This may seem primitive, but before FAO experts arrived to help them harvesting was carried out with a traditional type of small sickle.

FAO photograph.

and do what we can to promote the ideals and objectives of the United Nations Organisation and its agencies. Our interest and support should be given also to other assistance programmes such as the Colombo Plan, based, as it is, on similar ideals and objectives.

The successful development of a free community depends largely on the degree of acceptance of individual responsibility. We were prepared as individuals, as communities and as nations, to pay the price for victory in war, for our liberation from the threat of aggression and for freedom. Are we prepared, in a positive way and with a sense of urgency, to provide the time, the thought, the effort and indeed the resources necessary so that as individuals and as nations we may ensure that some real progress is made?

The Food and Agriculture Organisation

F.A.O. came into existence at Quebec in 1945, little more than a month after the cessation of hostilities in the second World War. Before the close of the meeting the representatives of 42 nations had signed the constitution of the Organisation. At the

last biennial conference of F.A.O. in Rome in November 1957 the representatives of 76 member nations took part in the proceedings.

F.A.O. is an association of member nations through which are represented many millions of people throughout the World. It is an Organisation which does not intrude into the affairs of any nation. It is a device created by nations themselves to facilitate discussion and examination of problems of mutual interest and concern. Nations desiring help and guidance on production and distribution problems within the sphere of interests of the Organisation may seek it through the Organisation. Many have received help, which, without the existence of such a body, would have been exceedingly difficult if not impossible to secure.

The factual information provided by member nations, analysed and collated by F.A.O. on such matters as world production year by year, on resources and production potential, the definition of specific problems, including the incidence of animal and plant diseases, and many other topics, has been extremely valuable. F.A.O. has assisted in the promotion of co-ordinated effort in

campaigns against the desert locust and in the provision and application of vaccines against stock disease. It has also produced a number of technical publications of value to governments and to technical officers in many countries.

Especially valuable have been the technical assistance programmes and the provision of fellowships for the members of one country to study in another. As is well known, our own country has taken part in the provision of specialists for short-term service in other countries and has provided training facilities for those who have come here.

Special studies on the food consumption position have been recorded in F.A.O. publications and provide useful and interesting information. In most countries, we are informed, the diet is based on cereals and starchy foods. Irrespective, however, of location, cultures, national habits or other factors, as incomes rise there is a progressive increase in the purchase of more expensive foods. This is especially true for those who live at the lowest levels of subsistence. A small increase in the per caput income gives rise to a rapid demand for the more valuable foodstuffs. Income determines what people eat. General economic development in a

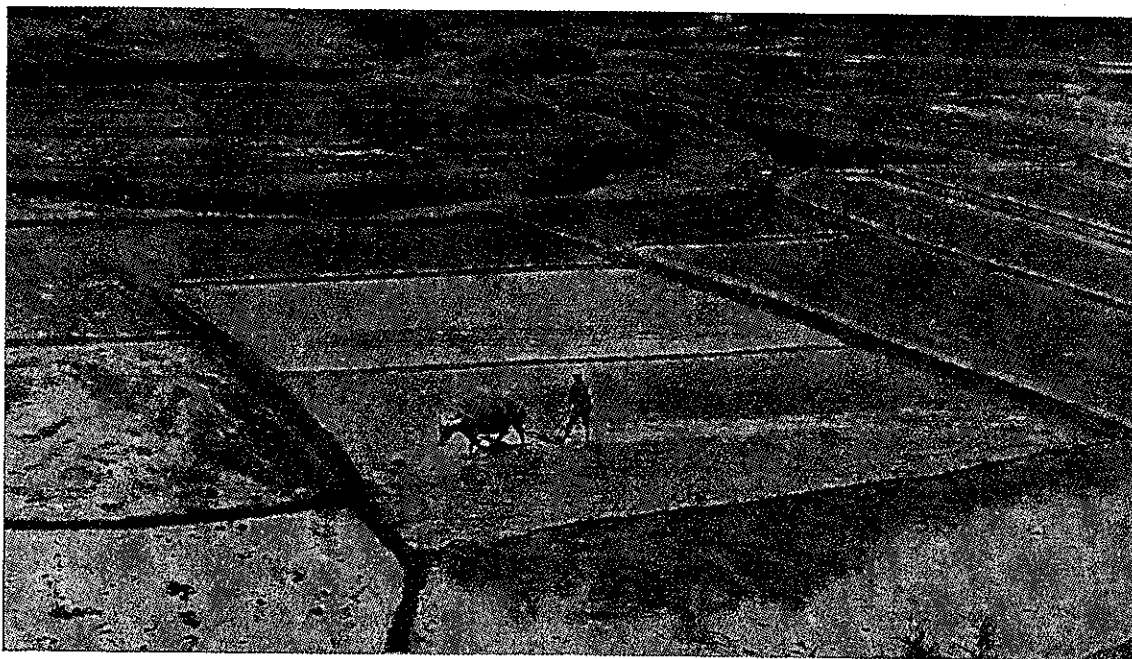
country creates demand for more valuable foodstuffs and results in improvement of nutritional levels for its people.

The ultimate effect could well be the development of markets for imported foodstuffs in countries which today are far from being able to pay for imports. As the reports indicate, however, what remains to be done is infinitely greater than that which has already been accomplished.

F.A.O. has been in existence for almost fourteen years. From its inception it was clear that the matters with which it would be concerned were those which would not permit an easy or rapid solution. It cannot be expected that progress should be other than slow. The important thing is that there should be a spirit of active willingness not only among nations but equally importantly, among individuals, to play their part in promoting such progress.

Production and Food Values

Primary producers in all countries have individual problems and difficulties, season after season, more numerous and more varied than is the case with those engaged in most other forms of enterprise. Not the least of their difficulties is that they are at the end of the line in the cost structure. In



Rice is the key item in the diet of large populations in the Far East. It is produced in paddy fields such as in this illustration from Burma. The search for better types of rice is a major task of FAO's Expanded Technical Assistance Programme.

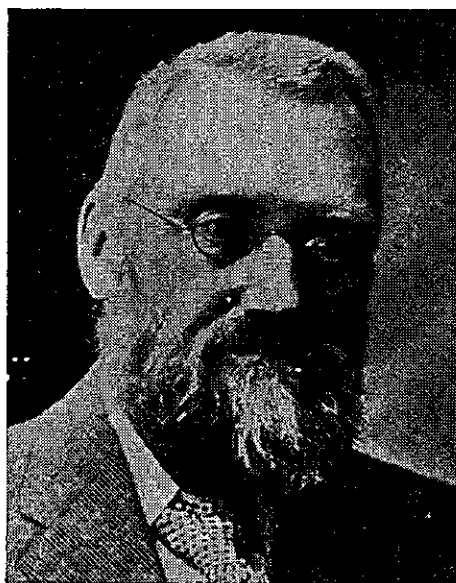
FAO photograph.

recent years, particularly, they have had to endure falling prices for their products in world markets yet the costs which they incur themselves in their business of production continue to rise.

All of us are concerned with the present and with the short and long term prospects of the future. It is self evident that production must be profitable to farmers or they cannot remain in production.

The paradox of the present position is that there is over-production of a number of agricultural commodities because of the absence of profitable markets but not over-production in terms of food and nutritional requirements of the world's population. The

William James Farrer
—1845-1906—



Son of an English farmer, Farrer came to Australia in 1870 and was a surveyor on the staff of the N.S.W. Lands Department. In 1898 he was appointed to the staff of the Department of Agriculture following the recognition of the value of his experiments with wheat. For his work as a wheat breeder, Farrer has been termed "Australia's greatest benefactor", pioneering the development of varieties suitable to Australia and making possible the extension of our wheat-growing areas by millions of acres.

reasons for this vary from country to country. Although progress in their solution is slow there is some consolation to be gained from the fact that trade discussions on such matters are being conducted much more readily and actively than was possible in earlier years.

As indicated previously, even slight improvements in the economic development of a country, which lead to increase in income, increase the demand for more valuable foodstuffs. Such foodstuffs include those containing proteins of animal origin. It would seem reasonable, therefore, to expect that there will be greater and greater interest in the livestock industries, especially in those countries able to meet such a demand.

Demand obviously will also depend on the price at which food is available. Consequently, once again, the importance of every measure to reduce production costs cannot be over-emphasised. High productivity will depend on high managerial skills. And the degree to which these skills are exercised is of importance not only to the individual but also nationally and internationally.

Australian Potential for Production

It is natural in a world concerned with its food production and potential that there should be increasing interest in the position in Australia. We live in a large continent, approximately 3,000,000 square miles in area, almost as large as the U.S.A. There is still, however, a belief in many countries that we have vast areas suitable for agricultural settlement which are by no means effectively utilised.

The late Professor A. E. V. Richardson examined the position in his presidential address* to the Australian and New Zealand Association for the Advancement of Science almost twelve years ago. He pointed out that we live in the driest of continents. Approximately three quarters of Australia is characterised by low and erratic rainfall and a high rate of evaporation. This huge portion of our country contains large areas which are uninhabitable.

Within this portion also there is country, somewhat less than 50 per cent. of the con-

*A. E. V. Richardson "Science in Relation to Australia's Development". Presidential address to Australian and N.Z. Association for the Advancement of Science. Perth, 1947.

continent, which was expected to carry only a sparse to moderate population of sheep and cattle. The remaining 25 per cent. includes land which is in a satisfactory rainfall zone for agriculture and intensive stock raising but it also includes mountainous areas and country which is unsuitable for agriculture.

It was further suggested that this leaves a figure of some 144,000,000 acres which can be brought under the plough and, of this, up to 48,000,000 acres might be expected to be available for cropping each year—an area which is double that placed under crop during the previous decade. In addition, as we know so well, we do not possess any great continental river system which would have meant so much in irrigation potential. Rather, it would appear that only one quarter of one per cent. of our land may ultimately be devoted to irrigation.

It is true that there have been changes since Professor Richardson made his review. Large areas of previously unproductive country have had their carrying capacity greatly increased by the application of superphosphate and appropriate minor elements as a basis for improved pastures. Areas which formerly carried one dry sheep to the acre are now carrying three to four and the sheep can be bred on country which formerly was quite unsuitable for this purpose.

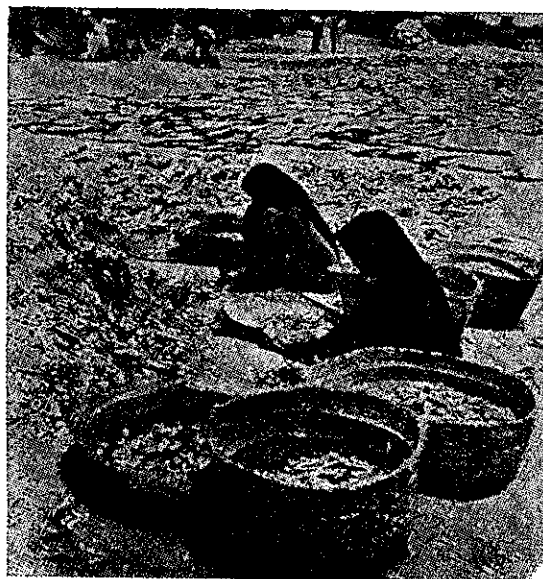
There are some who regard it as heresy for anyone to suggest that there are any limitations to Australia's production potential, that it should never be mentioned that we must expect drought in some portion of the country from time to time or that we may have a succession of dry spells; one should never draw attention to the fact that one-third of the continent—more than 1,000,000 square miles in extent—has an annual rainfall expectation ranging from 0 to 10 inches. Isohyets, however, are quite impersonal things; they speak for themselves. It is far better that we should be concerned with the facts as we know them and also appreciate new knowledge as it is brought to light. Our main task surely is to make the best possible use of our country in the light of all the facts available.

Our forefathers on the land encountered conditions in Australia entirely different from those with which they were familiar in the more benign environment of the United Kingdom. Systems of land management in the new country were gradually developed,

but the development in many instances was a slow and painful process. Mistakes were made and it is easy for us for example to assess now the losses—in some cases the irreparable losses—which have occurred through erosion of our soil, the most precious of our natural resources. Let us hope that we too, are not, quite unknowingly, making mistakes for which future generations may have to suffer.

Research and Production Trends

Our concern always must be that systems of land use and land management are such that soil fertility is maintained and wherever possible, increased. What is technically possible, however, becomes practicable only if it is economic. Increasingly during the present century the activities of devoted research workers in many organisations have provided answers to many of our problems. This vast country of ours with its varying conditions still urgently requires the services of many more research workers than have yet been available. There is only one way in which mistakes may be avoided—we need more facts. If we have the facts and if we can distinguish between those which are relevant and those which are not, we will have the one sound basis on which action should proceed. It is only on such a basis that we will be in a position to assess the end results of policies and programmes.



Pakistani women sorting the catch of fish. FAO is helping to modernise this industry in Pakistan.

The significance and importance of research in the primary industries is fully appreciated by producers who, to an increasing extent in recent years, have contributed funds for the promotion of research. In addition to work directly financed by research organisations and Departments, programmes planned and financed jointly by industry and government are in operation for the wool, wheat, barley, tobacco and fruit industries. Comparable arrangements are in progress for the dairy industry and

it is expected that there will also be a similar research promotion scheme for the beef industry.

Over all, productivity is improving. The total volume of production of agricultural commodities in Australia is approximately 30 per cent. higher than it was in the three immediate pre-war years except during the drought of 1957-58. This increased production has been achieved with a reduced total work force as is shown in Table I prepared by the Commonwealth Government*.

TABLE I.—Index numbers of males permanently employed on rural holdings and volume of production (1953-54 = 100)

	Owners, Lessees, Tenants, Share-farmers	Family Workers not Receiving Money Wages	Paid Employees	Total	Volume of Rural Production
Number employed (in thousands)—					
1953-54	241.1	22.8	93.7	357.6	..
Pre-war—					
1936-37 to 1938-39	n.a.	n.a.	n.a.	111	82
1947-48	100	124	97	100	89
1954-55	100	103	98	100	101
1955-56	101	92	94	99	107
1956-57	100	94	95	99	107



An Afghan farmer learns to use the European scythe in place of his traditional sickle.

An important feature of Australian crop production in recent years has been also the sustained interest in the coarse grains—oats, barley, maize and grain sorghum, the production of which seems likely to be of increasing significance in the livestock industries. Most striking, however, is the increase of sown pastures which is estimated to be at least three times the acreage sown in 1938-39. And this is but a fraction of the potential. Most of this development has occurred in country subject to our Antarctic winter rainfall influence. The promise of suitable pastures for the northern or summer rainfall country, from the intensive work still in progress, suggests that developments in the North will be as dramatic as those in the South.

If effective use is to be made of resources, yield per unit is the criterion on which to gauge productivity. Improved trends in the volume of production in this country have

*Commonwealth of Australia and the Territory of Papua and New Guinea—Report to the Food and Agriculture Organisation of the United Nations 1955, 1956 and 1957. September 1958, page 35.

Few methods of increasing meat production have such possibilities as the prevention of animal disease. In Afghanistan (right) FAO experts introduce the inoculation of poultry against epidemic sicknesses such as Newcastle disease; in Burma (lower) attention is being paid to the eradication of cattle diseases, such as rinderpest and anthrax and the new vaccines are being made in the country.

FAO photographs.



on the whole been associated with improved trends in yield per unit. Average yields have increased. For example, wheat in bushels per acre and the weight of wool per fleece, and a number of other commodities have increased. The statistical figure for average yield is but an index, the average of

a series of figures between extremes. The top figures however, show what is possible where good use is made of existing knowledge, resources and managerial skill. The margin between the extremes provides an indication of the potential scope for improvement.

AGRICULTURAL EDUCATION

Profitable crop and livestock production in this as in other countries, depends on many factors, the most important of which, surely, is knowledge. Knowledge may be gained through formal education, training and experience. Wisdom we hope, comes from an appropriate grouping of all three.

Twenty-one years ago Professor (now Sir Eric) Ashby delivered his inaugural address* as Professor of Botany at the University of Sydney. He stressed the value of studies in the natural sciences as part of a sound general education for life and citizenship. During the course of his address he quoted a statement made by T. H. Huxley, the distinguished English scientist (1825-1895), as follows:—

“Suppose it were perfectly certain that the life and fortune of everyone of us would, one day or other, depend upon us winning or losing a game of chess. Don't you think that we should all consider it to be a primary duty to learn at least the names and moves of the pieces; to have a notion of a gambit, and a keen eye for all the means of giving and getting out of check? Do you not think that we should look with a disapprobation amounting to scorn upon the father who allowed his son, or the state which allowed its members, to grow up without knowing a pawn from a knight?”

Yet it is a very plain and elementary truth, that the life, the fortune, and the happiness of every one of us . . . do depend upon our knowing something of the rules of a game infinitely more difficult and complicated than chess. It is a game which has been played for untold ages, every man and woman of us being one of these two players in a game of his or her own. The chess board is the world, the pieces are the phenomena of the universe, the rules of the game are what we call the laws of Nature.”

* Union Recorder, University of Sydney, Vol. 18, No. 17. Pp. 153-157. July 21, 1938.

There can be no question of the value of education which provides for an early appreciation of the factors which affect the growth and development and reactions of living things, whether they are plants or animals, and including man himself. We are all affected by the environment in which we live and of which we are a part.

On a previous occasion, in 1945, when commemorating the centenary of the birth of William Farrer, it was suggested that it was the aim of scientific study to determine what are known as natural laws. It did not matter whether the study was concerned with chemical reactions, the development of a quality of wheat, the improvement of aeroplane fuels or the relationship between men and nations. At the same time attention was drawn to the fact that we cannot change natural laws. It is said that science has given us great control over Nature. In a sense that is true but, strictly speaking, we have no control over natural forces at all. The physician who uses a healing drug, the plant breeder who develops a new variety, and the farmer who adopts a particular system of management of his pastures, are merely the instruments who set the stage, who enable certain phenomena to occur. One way of stating this fact is to say that they co-operate with Nature.

This business of farming is concerned with natural laws and natural phenomena. It has also to contend with complexities and hazards far beyond those which are the lot of many other enterprises. There can be no question, therefore, of the importance of education and training so that success may be more readily assured.

There are approximately 240,000 owners, lessees, tenants and share-farmers engaged in rural production in Australia. Practically all of them, individually, have to determine

their own programmes. Year by year they decide how their land is to be used and worked. They carry a great responsibility. Their decisions, based on their knowledge, training and experience—taking into account the intangibles of seasons and markets—are of the greatest importance to themselves as well as nationally and internationally.

In a population group of almost a quarter of a million certain changes occur each year. Mortality, illness, retirement, or simply the desire to change to another occupation, results in some thousands, possibly 2,000 or more, being required to assume the responsibilities of farm management each year for the first time.

Relatively few, however, have had the advantages of any formal agricultural education or training to assist them. Most have learnt what they know of the techniques of crop and livestock production by practical experience. Valuable as this is, it may well be questioned whether it is enough. Most farmers themselves do not believe that it is. The position, however, is that in this State as in other States, the demand for formal training such as is provided by agricultural colleges is in excess of the facilities available. For years past our own two State Colleges have been fully booked but the fact remains that the combined total of graduating students is somewhat less than 100 each year. Practically all remain in the land industries, some go back to the land, but the number is well below what may be regarded as a reasonable requirement for this State alone.

No secondary industry of any magnitude or with anything like the capital investment of the primary industries could hope to thrive under similar circumstances.

Agricultural education is a feature of agricultural life in a number of countries in Western Europe and large numbers of farmers "go back to school" each year. In this country there has been increasing interest in schools, special courses and conventions for primary producers. There has never been any question as to the interest of the Agricultural Bureau in this connection, for its members have strongly supported these activities.

Research has provided the answers for many agricultural problems. Sometimes the answers are dramatic and exciting, but more often they are not. Demonstration and experience over the years on farmers' own

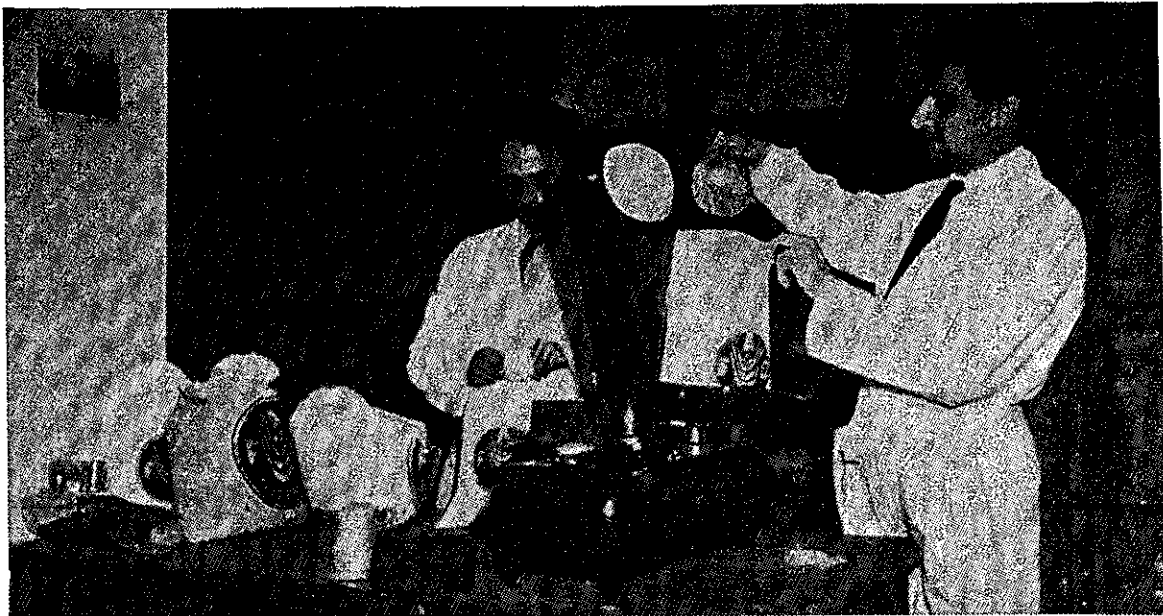
properties have proved the value of many new measures or variations of older ones. None of this, however, is of much value unless the new knowledge is widely accepted and applied. It will be agreed at once that there is a much higher degree of acceptance today than was the case in earlier years. Primary producers would be the first to acknowledge the help and assistance which they have received from State Departmental field extension officers. In their turn the latter would be the first to acknowledge the co-operation which they have received from producers.



An FAO cotton specialist teaches an Afghan farmer to drive a tractor.



A peasant farmer in Thai will soon be growing improved rice varieties recommended by FAO.



From FAO headquarters selected seed is sent to many parts of the world for experimental and hybridization purposes.

Income from the sale of all major agricultural commodities produced in this country depends very largely on market prices abroad. Costs are always important. They depend on many factors and among the most important are managerial skills in the use of the techniques of production. In the interests of the nation and the individual

it is essential that the best use is always made of the information so readily available. If higher and higher standards are to be reached it should be agreed that there is always something to learn. The value of agricultural education, using the term in its widest sense, cannot be overemphasised.

THE LIVESTOCK INDUSTRIES

No one can accurately forecast changes likely to occur in the pattern of production in this country. We have facilities for increased production, and resources surveys will provide more and more factual information as to what is possible. There is no question of the potential for greatly increased acreages of improved pastures, and the present suggested limits may be expected to expand as further pasture species and further improvements in strains become available.

If costs can be kept within reasonable limits the increased production, particularly of wool and of meat, should not present serious marketing problems. Important as our livestock industries are at the present time it seems likely that they will be even more important in the future. Cereals and potatoes comprise the great bulk of the world's food supplies, with an annual production of approximately 1,000 million metric tons. This is about twenty times the production of meat.

It may well be that an acre of land capable of producing edible plant protein in the form of peas, beans, pulses, etc., produces ten times as much protein as can be

produced by an animal or animals which graze over an equal area under the same conditions. The time may come also when the chemist will adapt unfamiliar sources of plant protein or even synthesise proteins suitable for human consumption. No one could deny such possibilities. At the same time it could not be asserted that in fact we do know all the virtues of the foodstuffs which are familiar to us today.

Nutritional studies are constantly providing new information but surely we haven't yet established all the reasons why meat, milk and eggs are so valuable as food for human beings. Foodstuffs containing protein, and especially protein of animal origin,

are likely to be in demand so long as the consumer-producer price is satisfactory to both parties.

Increased production of livestock will call for increased supplies of nitrogen. For the most part this will be provided by leguminous fodder plants, but this by no means excludes the possibility of the increased use of nitrogenous fertilizers. Further studies may be expected to show to what extent and under what circumstances they may be profitably used.

Phosphate Supply

The establishment and maintenance of increased acreage of improved pastures will be possible only if adequate supplies of

superphosphate are available. The supply of phosphate is a most vital factor in agricultural production in this country.

The following table prepared by the Commonwealth Government* indicates the use of fertilizer in this country. There is a heavy and increasing demand for superphosphate far in excess of other fertilizers. It is difficult for anyone to forecast what will be the demand for phosphate even in the short-term. A review of the position by F. H. Gruen†, (Economics Research Officer, New South Wales Department of Agriculture), suggested in 1955 that there could well be a two to three-fold increase in requirements for superphosphate in New South Wales by 1963 or 1965.

TABLE II.—Sales of Fertilizer in Australia

Year	Superphosphate	Sulphate of Ammonia	Potash
	'000 long tons	'000 long tons	'000 long tons
1954-55	1,993	89	27
1955-56	2,125	96	32
1956-57	2,056	109	40
1957-58	2,204	126	46

* Commonwealth of Australia and the Territory of Papua and New Guinea.

Report to the Food & Agriculture Organisation of the United Nations, 1955, 1956 and 1957., Sept., 1958. Page 17.

Studies‡ of the world supply and consumption indicate that, in comparison with total world consumption figures, the Australian requirement is small, being somewhat less than 10 per cent. The world supply of phosphate rock is sound. It appears that there is sufficient for world requirements for many centuries, while supplies of low grade rock are almost inexhaustible. Supplies of rock for Australia are derived from the Pacific and Indian Ocean islands. The quality of this rock is high, but it is suggested that supplies may be exhausted before this century is over. However, world reserves are such that, in the long term, all requirements should be met. Costs may be higher, and the quality of the superphosphate may be somewhat lower than is the case today.

Perhaps we should be doing some further work on the use of this fertilizer in Australia.

There cannot be any doubt that there will be great increases in the acreage of improved pastures, with an associated increase in livestock production in Australia. These increases however will not occur automatically. As at present many decisions will have

to be made by producers themselves; but the result of their judgment and the exercise of their skills should be such that valuable commodities, such as wool and meat, will find satisfactory markets.

Already over the last ten years there have been almost continuous increases in the livestock populations. It is probable that the figures for 1959 will be a record. Meat production has increased in recent years as will be evident from the figures in table III. This production is now approximately 250,000 tons higher than it was in the early years of the present decade. It has not had a marked effect on exports. It has mainly been consumed by the increased Australian population which also has now a higher per caput consumption rate.

† F. H. Gruen. Superphosphate use in N.S.W. Rev. Marketing & Agric. Economics, Dpt. Agric., N.S.W. Vol. 23. P. 30, 1955.

‡ T. H. Strong & E. A. Saxon. Phosphate fertilizers. Australia's need and supplies. Quarterly Review of Agricultural Economics. Vol. 7, pp. 5-11. January, 1954.



An Afghan inoculator, trained by an FAO team, vaccinates a cow against rinderpest, one of the commonest and most dangerous diseases of livestock over vast areas of Africa and Asia.

Control of Animal Disease

If there are to be markets for increased production of a desired foodstuff such as meat, the cost structure once again is of special significance. Selection and use of the best breeding material and the adoption of the best nutritional programmes cannot produce the desired results if there is wastage through pestilence and disease. There is little factual evidence of the actual extent of such wastage but from time to time estimates of losses are made and the figures run to millions of pounds. The incidence of disease is a factor of the greatest importance.

There are four traditional methods of dealing with disease problems; they are—exclusion, control, eradication, or by the development of resistance or immunity. The value of exclusion of disease by quarantines which aim at the prevention of introduction of new disease into the country is fully appreciated and needs no emphasis. Control by the use of medicaments, vaccines or other treatments is often the only means by which losses may be averted. Their cost sometimes may be but a fraction of the losses which otherwise would occur, but in

the aggregate they represent a substantial cost for the individual and the industry.

It is unthinkable that all of these costs should be the inevitable lot of the producer from year to year and from generation to generation.

For some pests and some diseases eradication is a practical possibility in the light of existing knowledge. Surely we can hope that the future agricultural history of this country will provide more and more examples of the successful completion of eradication campaigns.

The fourth avenue or possibility, the development of resistant or immune strains of livestock, may not appear particularly promising. The difficulties are great, infinitely greater, of course, than are those of the plant breeder who has been outstandingly successful in his development of resistant and immune varieties of crop plants. In spite of the difficulties it is hoped that here, too, is a field of work deserving of more attention in the future.

Productivity in any enterprise flows from the ability and the willingness to accept and

TABLE III.—Meat Production and Exports, Australia, '000 tons

	Mutton and Lamb		Beef and Veal		Pig Meats		Total	
	Production	Export	Production	Export	Production	Export	Production	Export
1950	358.1	85.7	606.5	84.7	90.2	8.8	1,054.8	179.2
1951	274.2	24.2	651.5	68.6	85.4	7.5	1,011.1	100.3
1952	282.4	14.6	581.9	39.0	84.8	3.8	949.1	57.4
1953	395.1	74.6	674.8	98.5	82.9	3.5	1,152.8	176.6
1954	364.8	44.7	704.3	129.8	84.4	2.6	1,153.5	177.1
1955	388.1	56.8	719.9	121.2	97.5	3.9	1,205.5	181.9
1956	380.1	53.1	751.1	144.2	93.9	1.6	1,225.1	198.9
1957	366.9	34.7	814.6	155.9	88.8	1.0	1,270.3	190.6
1958	411.1	49.6	776.2	123.8	97.9	1.2	1,285.2	174.6

Source : Annual reports of Australian Meat Board.

use available knowledge. Education, therefore, has to be regarded not as something which ceases at any point of time, but as something which each one of us accepts as a continuing process.

We live in an uneasy world in which the population is rapidly expanding. It has never produced enough food for its own normal nutritional standards. Promotion of economic development on a world basis is one of the most difficult of all problems and is one in which progress is likely to be slow. Promotion of efficiency in production can help in the promotion of markets.

The Food and Agriculture Organisation of the United Nations is designed primarily, through international co-operation, to help nations to help themselves in finding solutions for their production and distribution problems. In primary production a special

responsibility rests with each producer. He it is who makes the decision in his own production programme.

Every primary producer can rightly accept the fact that what he does in the ordinary course of his work is not only of importance to himself and the nation but is also of international importance. It may well be that progress in solution of the world's problems cannot be other than slow and difficult. That, however, should not deter us, either as nations or as individuals. Each one of us indirectly, but importantly, is part of this great new venture with its single specific purpose, the continued promotion of world peace.

Delivered at the first session of the thirty-fifth Annual Congress of the Agricultural Bureau of New South Wales, at Hawkesbury Agricultural College, 14th July, 1959.