Presidential Address

M. C. FRANKLIN*

It is my privilege to deliver the First Presidential Address to the Australian Society of Animal Production. I have no precedent to guide me. My address will deal mainly with one of the objectives of our Society - to increase primary production. Eighty-five years ago Disraeli remarked that the man who always studies one subject will view the general affairs of the world through the prism of his own atmosphere, but I hope my own experiences, studies, and interests have been sufficiently broad to permit me to offer you a spectrum of sufficient hues for each of you to choose at least one which will be to his liking.

The task of primary producers throughout the world is to produce as cheaply as possible and in optimum quantities the materials required to nourish and clothe the peoples of the world adequately.

Despite occasional surpluses of various products in some parts we are still faced with the fact that a large percentage of the world's population is undernourished and ill-clad. The population is increasing steadily and if this trend continues it could be doubled within the lifetime of the children of today.

Fortunately, scientific achievement is also progressing at a rate previously unknown in the history of scientific investigations. This is as true in the fields of animal production as in other fields of science. The younger members, in professions associated with animal production, are better trained today in the basic sciences than ever before. They are benefiting from years of experience and the accumulated knowledge.

Because of this rapidly growing pool of scientific knowledge it has become more and more imperative that steps be taken to ensure its rapid application in the field. Our Society, which draws its members from many fields of activity in primary production, can help to close the gap between what is known and what is applied. Before discussing this further, however, I would like to say a little concerning the origin of our own Society.

Formation of the Australian Society of Animal Production.

As the years pass and our organization grows, some may wonder at the events leading to its formation. In fact, even at this stage of our history, many of you may be unfamiliar with them.

Considering the importance of the livestock industry to Australia it is surprising that a Society of Animal Production was not established many years ago. In the U.S.A., our counterpart, the American Society of Animal Production, first met forty-six years ago. The New Zealand Society of Animal Production is now in its sixteenth year.

Our tertiary educational facilities may have had something to do with delaying the formation of our own Society. Until comparatively recently emphasis in the University courses taught in our Agricultural Faculties has been on the plant rather than the animal side and the two veterinary schools, the now defunct Veterinary School in Melbourne and its sister school in Sydney, catered largely for those interested in animal problems. Because of this, the emphasis among the majority of our graduates trained in the animal field was on animal health rather than animal production. No one should criticise this step in our educational development. It encouraged the growth of an active veterinary service in this country, and ensured a logical attack on many of our animal problems - disease control, proper nutrition, good management and sound breeding with the emphasis, rightly, on disease control and prevention. The latter must precede good feeding, management, and breeding.

Until recently, the interests of our graduates had been well served by the Australian Institute of Agricultural Science and the Australian Veterinary Association. The membership of these two professional organizations is

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restricted, however, and for some years now it has been increasingly obvious that an organization should be formed to serve the wider interests of the ever increasing number of workers in the diversified fields of animal husbandry. In particular, many of us have recognised the need to attract leaders of our rural community into our ranks and it is pleasing to record that we have been able to do so.

The Society's First Fellow - MR. C. EUSTON YOUNG.

In the latter connection may I digress for a moment. You may recall that I mentioned at the opening of this Conference that one of the Society's aims is to encourage and reward advances in animal production. The Society can do this by election of Fellows. According to the constitution, Fellows "shall be persons who in the opinion of the Council have rendered eminent service to animal production in general or to the Society in particular". This is the highest honour the Australian Society of Animal Production can bestow.

As many of you already know, the Society some months ago elected Mr. C. Euston Young, of Queensland, a Fellow of the Society. Mr. Young is well known throughout Australia as a leading member of the pastoral industry. He was manager, until his retirement a few years ago, of the Australian Pastoral Co., and for many years a prominent member of the Advisory Committee of C.S.I.R. and of many other organizations interested in rural matters. Those of us who have known him personally - and there are a number of us here in that happy position - can recall innumerable instances of his enthusiastic co-operation in our scientific investigations and of his generosity in providing animals, facilities, and his own time as well as that of his staff for our field investigations. The Society can well be proud of its first Fellow and the pastoral industry, too, should be glad that this same Fellow has been selected from their own ranks. That is as it should be, and I think it augurs well for the future of the Society.

Formation of Branches of the Society.

Let me return to the events leading up to the formation of our Society. I am indebted to Mr. R. H. Hayman, Officer-in-Charge, McMaster Field Station, N.S.W., for this information. Its formation was first discussed in 1946 but no positive steps were taken until late in 1950 when Professor P. R. McMahon, Miss H. Newton Turner and Mr. R. H. Hayman sent a circular letter to a number of scientific workers in New South Wales convening a meeting for 14th December, 1950, to discuss the formation of an Australian Society of Animal Production.

At this meeting, attended by twenty-two persons, it was resolved that the Society be formed. A steering committee, including Miss H. Newton Turner (secretary), Dr. A. A. Dunlop and R. H. Hayman (C.S.I.R.O.), Professor P. R. McMahon (N.S.W. University of Technology) and Dr. G. L. McClymont and Mr. E. A. Elliott (N.S.W. Department of Agriculture) was appointed to consult with interested parties in the other States and to draft a constitution.

Favourable replies were received from all states but only Victoria and Queensland considered that they could recruit sufficient numbers to form branches, and active branches were soon established there, as well as in New South Wales. Later, in 1953, a branch was established in South Australia.

In the meantime, the steering committee appointed at the December, 1950, meeting in New South Wales had prepared a draft constitution and copies had been circulated to all States.

At the 28th Meeting of the Australian and New Zealand Association for the Advancement of Science held May, 1951, in Brisbane, representatives of all States met to discuss the nature, aims, and scope of the Society and to discuss the draft constitution. Miss Turner, who had carried out the secretarial duties of the steering committee, had to relinquish this task and the work which she had helped to launch so successfully was continued by a new steering committee, elected at the Brisbane Meeting, including Messrs. Grahame Edgar, F. C. McCleery (N.S.W. Department of Agriculture), and R. H. Hayman (secretary). This Committee was charged with the responsibility of redrafting the constitution.

For the next two years, during which time active branches had been meeting regularly in Queensland, New South Wales, Victoria, and South Australia, further drafts were made of the constitution for presentation at a meeting held in, January, 1954, at Canberra during the 30th Meeting of the Australian and New Zealand Association for the Advancement of Science. Final agreement on the constitution was reached at this meeting and your First Federal Committee was elected. The Australian Society of Animal Production was launched.

The First Biennial Conference of the Society.

As its name implies one would expect and hope that the Society would draw its members from many branches of rural activity and that its deliberations would range over many fields. It is pleasing to find these hopes being realised so early in the Society's history. Of the papers which are being presented at this Conference you will find that eleven have been prepared by graduates in agricultural science, nine by graduates in veterinary science, one by a graduate in architecture, one by a graduate in animal husbandry, two by graduates in pure science - in this instance chemistry, five by diplomates of our agricultural colleges, one by a primary producer, and one by a stock food manufacturer and primary producer.

The Conference Programme.

Sheep: The subject matter shows an even wider diversity of interest. It would be difficult to exclude sheep from the programme of a biennial conference of the Australian Society of Animal Production and many fields are listed for discussion at this one. They include physiological, nutritional and chemical studies; wool production; general management; fat-lamb production; lambing performance and factors affecting lambing percentages; reproductive physiology and breeding performance; trace element and vitamin A requirements, and so on.

Beef cattle: It is pleasing also to find that several papers on beef production have been included. The annual value of beef and veal production in Australia is over £100,000,000 and the time has been long overdue for a more active share of this industry's problems in our research and extension work and at the Conference tables of our scientific societies.

Pasture investigations: There are also a number of interesting papers on pasture studies, and on land use, and in the interesting Field Day we have just spent at "Chiswick", C.S.I.R.O. Regional Station, and at the Field Day to be held at "Marani" on Saturday you will be seeing excellent examples of what pasture improvement can mean in our more favoured areas.

Pasture improvement in New England: The increasing interest in pasture improvement in New England is typical of what is taking place in many parts of Australia. In 1950, in New England, 54,000 acres had been sown to improved pastures; by 1953 the area had grown to 400,000 acres. It is estimated that approximately 10 x 10^6 acres are capable of pasture improvement in this area alone.

Pasture improvement in Australia: This work is undoubtedly one of the most fascinating and most fruitful changes taking place at the present time, and is destined to have revolutionary effects on the productive capacity and economy of Australia. This potential was referred to by one of our leading agrostologists, Dr. J. G. Davies, in his Presidential Address to the Eighteenth General Meeting of the Australian Institute of Agricultural Science in 1952. I would like to refer to a few of the points Davies made so ably in that address.

He mentioned that "under primitive conditions the pressure of population causes a change from a pastoral to a cropping regime, as more people can be kept alive on a short-term basis by growing crops for direct human consumption. But sooner or later the reckoning comes, soil fertility is exhausted, famine intervenes, and the surviving population is reduced to the number that can be maintained at subsistence levels on river alluvials and irrigation areas".

"Australia must consciously and actively retain a pastoral agriculture. Animals, particularly cattle and sheep, must always remain a dominant feature of our agriculture and they must be mainly fed on legume-based pastures. Failure to do this will eventually be disastrous, our land will become derelict, our soils eroded, and our rural population reduced to a coolie status. The rise and fall of nations and civilisations seem to be closely associated with the rise and fall of soil fertility".

The fascinating progress in improved pasture establishment is completely eliminating the likelihood of such grim possibilities in Australia. A better understanding of the functions of phosphorus, sulphur, molybdenum, and calcium has transformed improved pasture establishment in much of our better rainfall country. Research work has shown that several combinations of soil deficiencies must be corrected for optimum growth and proper nodulation of subterranean clover. As little as one ounce of molybdenum per acre, for example, has been needed to correct deficiency in this element, and one dressing will suffice for at least six years. Two hundred weight of lime per acre has given spectacular results in some areas. The same total pasture production has been obtained if the whole of the fertiliser for the first four years, in areas of superphosphate response, is applied as a single dressing in the first year. Complete fertiliser mixtures of superphosphate, lime, and molybdenum have given eight-fold, and sometimes even greater, pasture yields than super alone.

There will be a steadily increasing use of phosphatic fertilisers in Australian agriculture for establishing and maintaining improved pastures. Modern research work has emphasised how important it is to eliminate all soil nutrient deficiencies in order to obtain the maximum advantage from the phosphatic fertiliser. I wonder how many thousands of tons of fertiliser have been used inefficiently in the past!

Fundamental and field studies with various strains of Rhizobium and the Rhizobium-nodule relationship have opened a new era in legume establishment and striking results, particularly in New South Wales, have been obtained in recent work. Further North, tropical plant introductions are transforming the picture for beef production, particularly in coastal and near-coastal areas. At Fitzroyvale, near Rockhampton, for example, in one year overall protein yield from natural pasture, in which stylo **(Stylosanthes gracilis),** had been established was 858 lb. per acre, whereas natural spear grass produced only 135 lb. of protein per acre. This legume was introduced from Brazil by the Queensland Department of Agriculture and Stock and by C.S.I.R.O. as early as 1933.

The potential for these developments offer a new era of production in Australia. Referring to the country as a whole, Davies broadly classifies our continent of 300 x 10^6 square miles or 1900 x 10^6 acres as one-third desert, one-third semi-arid country, and one-third relatively well-watered land. This last third, approximately 600 x 10^6 acres, is the potential area for intensive development and is defined by the 15 inch isohyet in Southern Australia, 20 inch isohyet in Queensland, and the 30 inch isohyet in the Northern Territory and the Northern part of Western Australia. Davies states that this probably is an underestimate in the South and an over-estimate in the North.

An enormous area of this higher rainfall country is still undeveloped. Excluding the Northern Territory it represents about 445 x 10^6 acres, compared with 29 x 10^6 in crops, 27 x 10^6 in forest and 18 x 10^6 in improved pasture.

Assuming that 20 per cent. of these 445 x 10^6 acres cannot be improved because of mountainous terrain, industrial, urban, and other uses Davies points out that we are still left with the enormous area of 343 x 10^6 acres of land capable of improvement.

Even in the most highly developed State — Victoria — there is a total of 18 x 10^6 acres of unimproved land compared with 16 x 10^6 acres already developed. Davies estimates that the relative area awaiting pasture development in each State is Queensland, 192 x 10^6; New South Wales, 76 x 10^6; Western Australia, 39 x 10^6; Victoria, 18 x 10^6; South Australia, 11 x 10^6, and Tasmania, 7 x 10^6 acres.

I have referred to these estimates of Davies in some detail because they attempt to measure the ultimate goal of our pasture experts, and they indicate broadly where the greatest relative advances are likely to occur and what the future targets are in livestock expansion. For example, on the basis of an extra sheep per acre on pasture awaiting improvement Victoria and New South Wales may eventually carry an additional 94 x 10^6 sheep; and Queensland, on the basis of one beast to ten acres of country awaiting pasture improvement may eventually carry an additional 19 x 10^6 head of cattle.

Our potential for increased pasture improvement and increased carrying capacity are two of the most exciting changes awaiting full exploitation in Australia at the present time and it is pleasing to see work in this field featuring so prominently in our Conference programme.

Genetics and breeding: The fields of genetics and breeding are also well represented in the programme. I am not competent to judge the effect that genetic studies will have on lifting wool and beef production in Australia over, say, the next fifty years. I confess that as an animal nutritionist who has visited every State in Australia and the Northern Territory, I feel that our level of production over the next fifty years will be influenced far more by the research efforts we direct to the nutrition of our livestock than to the breeding. I admit, of course, that that position could alter if our sheep and cattle breeders fall down on the breeding side of their programme in the years to come, but there is no reason to believe that they will not maintain their excellent record of the past.

In Australia average greasy wool production has risen from about five pounds in 1880-85 to between eight and nine pounds per head in 1925-30. Since then the increase has been slight with average fleece weight of our Merino sheep more or less static over the last twenty years. Does this mean that the methods of selection for improvement adopted in the past have given the

maximum results possible? If this is so will actual measurement of fleece characters raise production to a new plateau and what are the upper limits of selection potential? These important questions will no doubt be discussed at this Conference as some of the papers deal with this very subject.

Fodder conservation and droughts: Other important phases of rural production which are to be discussed at this Conference are those of fodder conservation and of drought. In a country like Australia no two more important subjects could be included on the agenda of a Conference concerned with the problems of animal production. No field of investigation with which I have been associated, since I graduated nearly thirty years ago, has interested me so much as have these two.

Let me refresh your memories with a few facts on these two subjects because no other environmental factor has acted upon our livestock so despotically, or left so deep a mark.

According to the Commonwealth Statistician hay production in Australia averaged 3.5 x 10^6 tons for the five year period ending 1938-39. It then fell to little more than 2 x 10^6 tons annually in the four years 1948-52. During the last three years it has risen again to approximately 3 x 10^6 tons a year — a tragically low figure in a country haunted by the spectre of drought. Even including silage and fodder grains such as barley, oats, maize, and grain sorghum, Australia's fodder conservation is totally inadequate for any serious emergency.

We have had a succession of good seasons since 1947 and in that time a new generation has grown up and settled on the land. Many of them have, perhaps, never seen an "old man" drought or certainly have never had to run a property under such conditions. Even many of the older hands, from statements one hears from time to time, appear to have forgotten what a drought is like or say that conditions have altered and that it will not happen again. They mention the increased acreage of improved pastures, the increased yield per acre resulting from the advances in knowledge concerning fertiliser treatment, the spectacular decline in the rabbit population as a result of myxomatosis, the increase in irrigation with all its beneficial effects, and striking improvements in farm machinery and, in particular, machinery for fodder conservation.

Irrigation and improved harvesting techniques if properly used can assist in an attack on droughts but pasture improvement, correct fertiliser use and even rabbit eradication are not the answers to drought control. They contribute to the growth of our total livestock population. The data I have already given indicate the huge potential for this expansion as more and more country comes under pasture improvement. But the need for increased fodder conservation as hay, silage, grain, standing fodder reserves or the strategic movement or sale of livestock will become increasingly important with these advances. Those who believe otherwise are living in a fool's paradise.

Some of our past droughts have been devastating in their intensity. There have been many in the last sixty years — 1892 to 1902, 1914, and 1944-46 have been among the worst.

The prolonged droughts of 1892-1902 halved the sheep population. It took thirty years to build it up again to the 106 million of 1891 and a further 10 years to reach a new peak of 125 million in 1942. Then followed the disastrous droughts of the middle '40's. New South Wales and Queensland were most seriously affected with decreases of 15.7 and 9.5 million sheep respectively, representing 24 and 38 per cent. of their flocks. It was nearly ten years before the sheep population in New South Wales was back to that of the early '40's; that of Queensland is still below it.

Except for relatively small pockets of drought Australia has experienced a run of good seasons since 1946 and this, combined with a large expansion in pasture improvement, a (better use of fertilisers, and rabbit control have enabled stock to be carried through in good condition. Indeed, these good seasons have been responsible for a steady increase to record levels of approximately 16 and 130 million respectively in the cattle and sheep populations, and what is more, they have produced such a superabundance of excess pasture over a wide area that many millions of the stock lost in 1944-46 could have been carried subsequently had adequate provision been made for their survival during that period.

Unwillingness to conserve sufficient fodder in times of plenty, the "untaken harvest" of Australia has cost this country many hundreds of millions. This is true even of that one drought in 1944-46 as the following data show.

In 1944 the sheep population was 123.2 x 10^6; three years later it had fallen by 27.5 x 10^6 to 95.7 x 10^6 — a decrease of 22 per cent. Wool production fell at the same time from 3.6 down to 2.9 x 10^6 bales — an actual drop of 657,117 bales or 18 per cent. of the 1944 clip.

During 1945 and 1946 the Australian average price of wool per pound was 15.7 pence. It then climbed steadily to the boom price of 144.2 pence of 1950-51 and then dropped back to 72.4, 81.8 and 81.5 pence in the three succeeding years. That brings us up to 1953-54 when production was again back to that of the early '40's. Had we been able to prevent those losses of 1944-46, our cumulative wool cheques over the succeeding ten years could well have totalled an additional £600,000,000.

Annual losses in Australia's wool cheque were £ 16 x 10^6 in 1945 and again in 1946. In succeeding years, as wool prices rose rapidly, losses were £26—, £40—, and £ 66 x 10^6 respectively, and the staggering loss of £ 148 x 10^6 i n 1950-51. Wool prices then dropped and the annual loss fell to £74—, £84— and £ 84 x 10^6 in the following three years.

In calculating these losses, it has been assumed arbitrarily that the extra wool production on which these figures are based would not have affected the actual average selling price. Such an assumption may be wrong, but the world was wool-hungry during those boom years and it seems reasonable to assume that an additional 192 x 10^6 lb. of wool annually would not have lowered the price seriously. At all events, it is safe to say that the 1944-46 drought has cost Australia some hundreds of millions of pounds over the ensuing years. Unfortunately, the prosperous post-war years have blinded most of us to this invisible loss, the legacy of that drought.

Of course, I admit that it was impracticable at that stage of our rural development for our husbandry to be geared to prevent the total loss I have mentioned, but some compromise between those staggering losses and complete survival should have been possible.

Our knowledge of the feed requirements of sheep for survival, information on the utilisation of roughages of extremely low-quality, and the production of silage and its storage and use in some of the more vulnerable areas has progressed considerably over the last ten years. The application of this information in future droughts would help to avoid the grim losses of the past.

Unfortunately, too few have profited from the lessons cf the past and from the research of recent years, and the conclusion is inescapable that a repetition of the severe drought conditions of the middle '40's could effect our economy just as disastrously as was the case only ten years ago. Our sheep population now exceeds 130 x 10^6. A decline of 22 per cent. would reduce it by 28.6 x 10^6 head. This loss in terms of wool production could total approximately 257 x 10^6 lb. or 850,000 bales, and would amount to an annual drop of £75,000,000 in our wool cheque at present wool prices.

In this analysis of our drought losses, I have considered wool only. Fat-lamb production, beef production, and other primary products are also seriously affected during a severe drought and these losses, too, would help to swell the staggering totals I have already mentioned.

No, I see no reason for complacency when considering the prosperous years our rural community has been enjoying and sharing with our urban population.

I don't think anything in my whole career has left such a vivid impression on my memory as some of my drought experiences during my early years with C.S.I.R.O., and I do not wish to see the scenes repeated. In the 1940 drought in north-western New South Wales, I was on properties where over half the sheep and cattle died and the smell of rotting carcases hung like a pall over the countryside. I saw the story repeated again in southern New South Wales in 1944, and the same thing was happening in many other parts of New South Wales and Queensland. And while our flocks and herds were being decimated, the economy of the country was suffering. I recall one well-known grazier saying that he "would not get out of the hands of the banks in his lifetime, and doubted if they would in his sons' lifetime". It was only the boom prices of the late '40's and early '50's, and a succession of good seasons that enabled them to recover from the severe financial set-backs of previous droughts. Those years of boom prices and such a long succession of good seasons may not be repeated in our lifetime.

Just how good have seasonal conditions been? My work has taken me to many parts of New South Wales for some years now and, although isolated pockets of drought have occurred, the State has, on the whole, enjoyed excellent

conditions since the end of 1946, and the sheep population of New South Wales has climbed steadily from 43 x 10^6 in 1947 to nearly 60 x 10^6 today.

Recently I visited "Dalkeith", wellknown for more than a half century as the home of the McMaster family. This property at Cassilis is approximately 220 miles north-west from Sydney on the Central Northern Slopes of N.S.W. Those who have had the good fortune to visit this property know the meticulous care with which the late Sir Frederick McMaster, and since his death, Miss Thelma McMaster, have kept detailed meteorological records for that district. Those records go back to 1878, a period of 77 years. Not only do they provide a valuable record for that area but also, in the opinion of those who have a good knowledge of western conditions, provide a reasonable guide of the rainfall for a large area of the Western Slopes of N.S.W., one of the important sheep raising areas in the State.

It is surprising, too, how closely the data over these 77 years can be correlated with the major fluctuations in Australia's sheep population. The Dalkeith average rainfall over the last 77 years is 23.76 inches. But 1897, 1899, 1901 and 1902 with rainfalls of 18.73, 18.31, 16.17 and 17.15 inches respectively, were well below this average. During those dry years of the late '90's and early '00's, Australia's sheep population was halved; Sir Frederick McMaster has told me on more than one occasion that Dalkeith had similar heavy losses during that same period. In 1912 and 1915, rainfall at Dalkeith was again well below average with 16.62 and 12.5 1 inches. In 1918 and 1919, there were two successive dry years of 15.86 and 13.52 inches. In 1922 and 1923, the pattern was somewhat the same with 13.40 and 13.20 inches. Only 10.87 inches of rain fell in 1888 — the driest year in the 77-year period from 1878-1955.

If you examine the Commonwealth statistics you will find that these dry periods have coincided with disastrous drops of many millions in Australia's sheep population. I should mention, however, that Dalkeith did not share in these later losses. After the heartbreaking losses at the turn of the century Sir Frederick practised and preached for the next fifty years a policy of "reserve stocking" — fodder conservation as dry standing roughage and clover burr in the paddock, and those who have seen Dalkeith in a severe drought know how successful that policy proved to be. My first visit to Dalkeith was in October, 1940. That year, Dalkeith recorded only 13.67 inches of rain but, despite this, the stock came through in reasonable condition. This property stood out like an oasis — admittedly a brown one — in the drought-stricken north-west that year.

There is no reason why these dry years will not recur and, because we are no better prepared to cope with them — in fact I would say we are worse prepared because our livestock population is so much higher and their economic value so much greater — the losses could be at least as heavy as they have been in the past.

To view these dry years in their true perspective, one should refer briefly to the wet years also. The Dalkeith annual average for the 77-years I have already stated is 23.76 inches. The last nine years, 1947-1955, have averaged 29.06 inches. The period 1926-1934 was another succession of good years with an average of 26.32 inches. An analysis of all the data for the 77 years shows that rainfall has exceeded 40 inches in two years (1950 and 1955); it has exceeded 35 inches in four years; 25 inches in 29 years. It has been less than 25 inches in 48 years and less than 15 inches in 8 years.

The history of Australian droughts is written in the Dalkeith rainfall records but, unfortunately, the lessons they teach have been learnt by so few.

Beef Cattle Production.

I referred earlier to the growing interest in beef production in Australia. During the last ten years this interest has quickened in all fields including production, processing, marketing, disease control, parasitism, breeding, and nutrition. Valuable regional surveys have been undertaken. The importance of quality, and factors affecting quality, have assumed greater importance as export markets have become more competitive. Teaching, extension, and research work in beef cattle husbandry have shown healthy signs of casting off the bonds which have restricted them for too many years. In fact, of late, there has been scarcely any important aspect of beef production which has not come under public scrutiny and, at times, public criticism.

There have been times when the public may have been puzzled at rapid changes in published opinions. I am thinking now of the confusion concerning world production targets. It is not so long ago, for example, that the Food and Agriculture Organization of the United Nations was stressing the need to produce more and more foodstuffs; today the Organization is giving some support to those who are suggesting restricting acreages in certain countries in order to keep down surplus production of maize, wheat, cotton, rice, peanuts, sugar, and butter.

May I digress for a moment and examine this work of F.A.O. so that we may better understand the reasons for these changes. When F.A.O. was formed in 1945, world food production was lower than in the immediate pre-war period, there was an acute shortage of food in most parts of the world, and world population had increased by approximately 125 millions since the outbreak of war. The average per capita food consumption at the end of World War II was estimated to be 12 per cent. less than in 1938.

By 1952-53, food production per head had regained the pre-war level and since then there has been further improvement so that the average dietary standard throughout the world today is slightly higher than it was prior to World War II. The overall position, however, is still by no means satisfactory. Food consumption levels vary tremendously in different parts of the world — some areas are still below pre-war levels whereas in others consumption is substantially in excess.

There is still a vital need to expand consumption of foodstuffs in most parts of the world, but the problem is no longer as straightforward as in 1945. It is not merely a question of increasing output but of organizing distribution, and of increasing the efficiency of production. The large food surpluses which are embarrassing the U.S.A. at the present time emphasize this only too well.

It is important that underdeveloped countries be assisted to raise their living standards so that in the long term the peoples of those countries will be able to afford a higher level of food consumption.

Thus, whereas in 1945, F.A.O. was concerned mainly with food shortages, since 1953 it has also been concerned with food surpluses. It has now adopted a policy of selective expansion of agricultural production, with a view to encouraging greater food production in those areas where food is most urgently needed. This policy of selective expansion will have to be continued in the future. With serious surpluses of wheat, rice, and other farm products in some countries, and yet completely inadequate dietary standards in others — and in some cases, even in those countries where surpluses exist — the problems facing F.A.O. in its second decade will not be easily solved. However, as Dr. F. T. Wahlen, Director of F.A.O.'s Agriculture Division, stated at a recent conference of the organization in Rome, F.A.O. has shifted its major emphasis on improving world living standards, from simply production of agricultural goods to "productivity per man, per acre, and per unit of cost".

How does beef production in Australia fit into this background of world food production?

Protein is one of the most serious and widespread dietary deficiencies in the world today. The morbid effects of partial protein deficiency on the human race are: subnormal stature and general worsening of physical appearance, a reduction in resistance to disease and, in extreme shortages, symptoms of hunger oedema which, to quote de Castro "gives its victims the grotesque proportions of badly-sewn rag dolls".

This deficiency has had a degrading effect on the anthropological character of the individual. Until comparatively recent times, it has set the boundaries of human occupation in certain parts of the world. It appears to have had a significant effect on fertility and, therefore, on the growth of human populations. As the consumption of animal protein rises, the fertility has fallen.

Various expert committees have carefully considered human protein requirements. In 1934, for example, a Joint Conference of the Nutrition Advisory Committee of the Ministry of Health and Nutrition Committee of the British Medical Association agreed that the total daily protein requirement of man was 80 to 100 g. The general consensus of opinion was that approximately one half of this should be first class protein, that is animal protein.

What is the daily consumption of animal protein by peoples in different parts of the world? In 1952, Josue de Castro, Chairman, Executive Council F.A.O., referred to this in his book "The Geography of Hunger". The following

are selected from these data and, because of their significant interest, birth rate data are also included.

Country	Daily consumption of animal proteins g.	Birth rate
Formosa	4.7	45.6
Malay States	7.5	39.7
India	8.7	33.0
Japan	9.7	27.0
Italy	15.2	23.4
Germany	37.3	20.0
Denmark	59.1	18.3
Australia	59.9	18.0
United States	61.4	17.9
Sweden	62.6	15.0

At all events that was the relationship between animal protein consumption and birth rate prior to de Castro's publication a few years ago. Recent trends emphasise that other factors may play a dominant role in population growth. The population of Japan, for example, was increasing in 1947 at the rate of 34 per thousand people annually. By 1950 this had been cut to 28 per thousand and in 1955 it is estimated the rate of increase was only 19 per thousand, or 3.5 per thousand lower than the Australian birth rate for the same period. Birth control, and an exceptionally high abortion rate, have been responsible for this rapid change over a period of only eight years, in the Japanese birth rate. Japanese Government officials estimate that there are now 2,300,000 abortions annually in Japan and but for these the population of Japan would be growing at 3,400,000 a year instead of the present rate of 1,100,000. If accurate data were available one might find a closer correlation exists between animal protein intake and conception rate, a suggestion which is supported by Slonaker's work, published in the early thirties in The American Journal of Physiology.

Against such a background of animal protein insufficiency in so many parts of the world, one feels that it would be calamitous if beef production came under the same fire of criticism of over-production, and distribution bogies, that have been levelled at other products. The facts do not indicate that this will occur. According to data compiled by the Commonwealth Economic Committee in the United Kingdom, exportable surpluses of beef from the main exporting countries have fallen by almost one third from 757,900 tons in 1938 to 510,500 tons in 1954.

It seems surprising, with this picture before us, that Australia is concerned at times with the disposal of its exportable surplus of beef. Practically all of this is exported to the United Kingdom where it competes mainly with beef from the Argentine and New Zealand. According to data compiled by the Commonwealth Economic Committee there have been interesting changes in the tonnages of carcase beef shipped from these countries.

Country	Imports of beef into the United Kingdom '000 tons 1938	1954
From: Australia	109.0	83.4
New Zealand	45.2	48.6
Argentine	354.3	86.9
Other countries	66.8	10.9

The relative shift in importance of Argentine and Australian supplies of carcase beef to the United Kingdom is interesting. These figures do not tell the whole story. The picture of beef production, consumption, and exports is very incomplete if one ignores production of canned beef.

Prior to World War II, the Argentine was the largest producer and exporter of canned beef in the world; today Australia occupies that position. From information supplied by the Australian Meat Board for the twelve-month period ending 30th June, 1955, Australia produced 76,800 tons of canned meat. Of this, 61,400 tons were exported and 40,000-50,000 tons would be as canned beef and would be equivalent to 80,000-100,000 tons of carcase beef. Approximately 85 per cent. of Australia's canned meat exports were shipped to the United Kingdom. Again, the Commonwealth Economic Committee's data on United Kingdom imports of canned meat makes interesting reading in relation to the well-being of our beef cattle industry.

Country	Imports of canned beef into the United Kingdom —'000 tons 1938	1954
From: Australia	3.5	41.4
New Zealand	0.6	6.9
Argentine	35.2	16.6
Other countries	14.9	22.6

If the recent changes in export figures from our most active competitor, the Argentine, and from Australia are maintained, steady expansion of our beef industry seems assured.

That this is so is supported by the information contained in an interesting report on some of the more important changes in the industry in the Argentine published recently by R. W. Linkson, Secretary, Australian Legation, Rio de Janeiro, Brazil, in the Pastoral Review (Oct. 15 issue, 1955).

In the period 1935-39 total annual beef production in the Argentine averaged 1,667,000 tons. Local consumption was 1,052,000 tons and 616,000 tons were exported. The increase in the human population from 13,500,000 in 1937 to 18,566,000 in 1954, and an increase in the annual per capita beef consumption from 170 lb. a head in the period 1935-39 to 185 lb. per head in 1954 have effected a large change. In 1954, Argentine produced 1,795,000 tons of beef. Local consumption was 1,555,000 tons and the exportable surplus had fallen to 240,000 tons from which 86,900 tons of carcase beef and 22,300 tons of canned beef were exported to the United Kingdom.

Let us consider Australia's production in more detail. One of the most disturbing features of Australian statistics on beef and veal production is their violent fluctuations. In 1915, there was a record production of 429,900 tons; four years later it had fallen to 274,200 tons. In 1925, production reached a new record of 505,000 tons; six years later it was down to 344,100 tons. In 1938, another record was made with 596,800 tons; eight years later it had fallen to 406,600. Old records again toppled with a production figure of 714,100 tons in 1955.

These fluctuations have not all been due to disease and changes in nutrition, management, and breeding, although each of these factors has undoubtedly played its part. These changes are bad for the industry and make it difficult to assess our ability to satisfy year in and year out internal requirements and, at the same time, expand export markets. What are those requirements?

Australia's population, estimated at 9,256,049, on 30th September, 1955, is increasing by approximately three per cent. annually and, if this rate of increase is maintained, will be 16,810,000 by December, 1975, less than twenty years hence.

The average per capita beef and veal consumption for 1954-55 was 119.2 lb. and, if this remains more or less constant, a population of 16,810,000 will require 898,500 tons.

Exports for 1954 and 1955 totalled 129,900 and 121,200 tons respectively, an average of 125,550 tons.

Hence, Australia's target for beef and veal production by 1975, assuming a steady 3 per cent. annual increase in the population, a per capita consumption of beef at the 1954-55 level and an export level similar to that of the 1954 and 1955 average, would be approximately 1,024,000 tons, an increase of 43 per cent. on the 1955 production figure of 714,100 tons.

During the past 20 years, from 1935-55, beef and veal production has increased by nearly 56 per cent. I see no reason why the above goal for 1975 should not be achieved, or even exceeded, but there should be no place in our economy for the violent ebbs in the production of the past. Prevention of the latter lies largely in our own hands but, unfortunately, the steps we have taken so far to prevent them are not soundly based.

CONCLUSION

It is by considerations such as these that one can obtain a clearer picture of problems affecting our economy and the goals for which we should aim.

One would be foolish to attempt to forecast with any degree of dogmatism the changes which are opening fascinating vistas down the passageways of time. It is certain that these changes will transform our living standards and our ways of life, to an extent that no one can foresee at present, in fields of education, religious leadership, the physical sciences, and utilization of energy resources within the earth as well as those that come to us from other planets, in agricultural engineering, in the science of genetics as well as in other biological sciences, in climate control, conservation of fresh water, reclamation of waste water from industry, the conversion of sea water to semi-fresh water, and so on.

These goals may be setting targets on horizons too distant for most of us, and for such there are goals nearer at hand and easier to attain.

Michael Roberts in his "Estate of Man" calculates that each man's estate, the world's area divided by its population, is 15 acres per person composed of five acres of jungle or forest, four acres of desert, two acres of semi-desert, two acres of polar snow and two acres of agricultural land. A hundred years ago the estate per man was double its present size. Today, due to population growth and loss of land, each person's share is shrinking at a rate of one acre every ten years. I am sure you will all agree that this is a sufficient challenge to all of us and, as I inferred in my opening address yesterday, each and every member of the Australian Society of Animal Production can assist in solving the problems arising from or aggravated by these changes.