1982

Senate Standing Committee on National Resources

Department of Agriculture and Food, Western Australia

SENATE STANDING COMMITTEE

ON NATIONAL RESOURCES

Submission by

Department of Agriculture

Western Australia

INDEX

INTRODUCTION

The Terms of Reference for this particular enquiry by the Senate Standing Committee on National Resources, list specifically the Commonwealth's role in rural research and extension. The status of the Australian rural research scene has been investigated and re-investigated several times in recent years and there has been some interest also in extension. Some of the more pertinent research enquiries were as follows:-

- OECDD Examiners Report on Science and Technology in Australia - 1974.
- Green Paper - Rural Policy in Australia - 1974.
- Industries Assistance Commission Report - Financing Rural Research - 1976.
- Committee of Inquiry into CSIRO - 1977.

In each instance the general conclusion was that there should be no overall reduction in the national rural research effort, and in some instances increases were suggested in specific diciplines.

These enquiries took evidence in the early to mid 1970s. It would have been expected therefore that their recommendations would now be well into the implementation stage with Australian rural research being in a stable or expanding generally thriving situation. Instead the trend has been the precise opposite. In 1973/74 approximately $150 m was spent on rural research*. A CPI adjusted maintenance level would indicate a figure for 1980/81 of some $300 m, instead the figure was closer to $200 m. Thus, over the seven years the funding available for rural research dropped by approximately one-third in real terms.

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* Industries Assistance Commission Report 1976.

The Commonwealth's involvement in rural extension commenced in 1951 with the Commonwealth Extension Services Grant (CESG). Through this grant it continued for many years, an active involvement. In 1977 Standing Committee on Agriculture produced a discussion paper outlining the benefits which had accrued to the Australian rural industries as a result of CESG, and extension and regional research generally. The following year the Grant was cut by 50 per cent and in 1981 the Commonwealth ceased its involvement in extension, the funds being made available to the States as part of the General Revenue Assistance Grants.

In 1978 the Minister for Primary Industry announced the establishment of the Commonwealth Council for Rural Research and Extension as an advisory body. In 1981 the Council was abolished.

Clearly there are dominant forces operating to produce this trend for the Commonwealth to withdraw from rural research and extension. The declining rural vote and the ramifications of the monetarist or Friedman economic theory perhaps being but two of the more likely.

The Department does not accept that the current Commonwealth approach is acceptable for the nation, it comments in this submission on the dangers, but also suggests a rethink on existing policies if the status quo of 1981/82 in overall real monetary terms is to be maintained at its present level.

The principle current Commonwealth Government contribution to rural research is through the CSIRO, and thus this organisation is referred to frequently in the submission.

To support the proposals being presented to the Committee, it is necessary in the submission to give data on Commonwealth, State, or national expenditure on research. Whenever possible this data has been taken from published documents and its source is acknowledged. In each instance some latitude needs to be extended for there are variations in interpretation as to where rural research begins and ends. There are substantial grey areas on the fringes relating to programmes such as conservation, agroforestry, wildlife and vermin control, food processing and storage, marketing, etc. The rapid rate of inflation in recent years has also been a problem. Thus, different estimates for the same time period may quite validly vary by 10 per cent or more.

In the first instance it is appropriate that the Committee be provided with some background to agriculture in Western Australia and the research and extension being undertaken within the State by the Department, and other organisations. In turn, this will provide the background and reasons for the views expressed in the following parts of the submission dealing with the Commonwealth's current and future involvement in research and extension.

RURAL PRODUCTION RESEARCH AND EXTENSION
IN WESTERN AUSTRALIA

Western Australia produces some 15 per cent of the national rural production in gross value terms and is responsible for approximately 20 per cent of the rural exports. The two main industries are wheat and sheep. About 40 per cent of the national cereal crop is sown within its borders with the grain production usually about one third of the national total according to seasonal conditions. The State has some 25 per cent of the national sheep flock.

Dairying, horticulture, beef cattle and pigs are relatively small industries representing five to 10 per cent of the national total in each instance. They are dependent largely on the local market although the beef cattle industry in the Kimberley is export orientated.

A feature of the farming scene in Western Australia is the relative newness of much of its production basis with two-thirds of the land currently in use being cleared in the past 30 years (Figure 1).

The State's rapid expansion in primary production commenced about 1950 and over the following 20 years seven million hectares of new land was cleared and brought into production (Figure 1). Currently there are 15 million hectares in use and there remains a smaller area of uncleared land on private property or Crown land which could be cleared. Projections for each of the major rural industries up to the year 2000 indicate a possible 10 per cent increase in cleared land, a 10 to 20 per cent increase in livestock and a 20 to 30 per cent increase in cereal production. Naturally these projections are based on the assumption that there will be an adequate level of research and development, and that the marketing situation is satisfactory.

On the evidence available, the State's total rural output could continue to increase at a faster rate than that of Australia as a whole. By the end of the century it should be a leading export State and in terms of gross value of production should rank appreciably higher than at present.

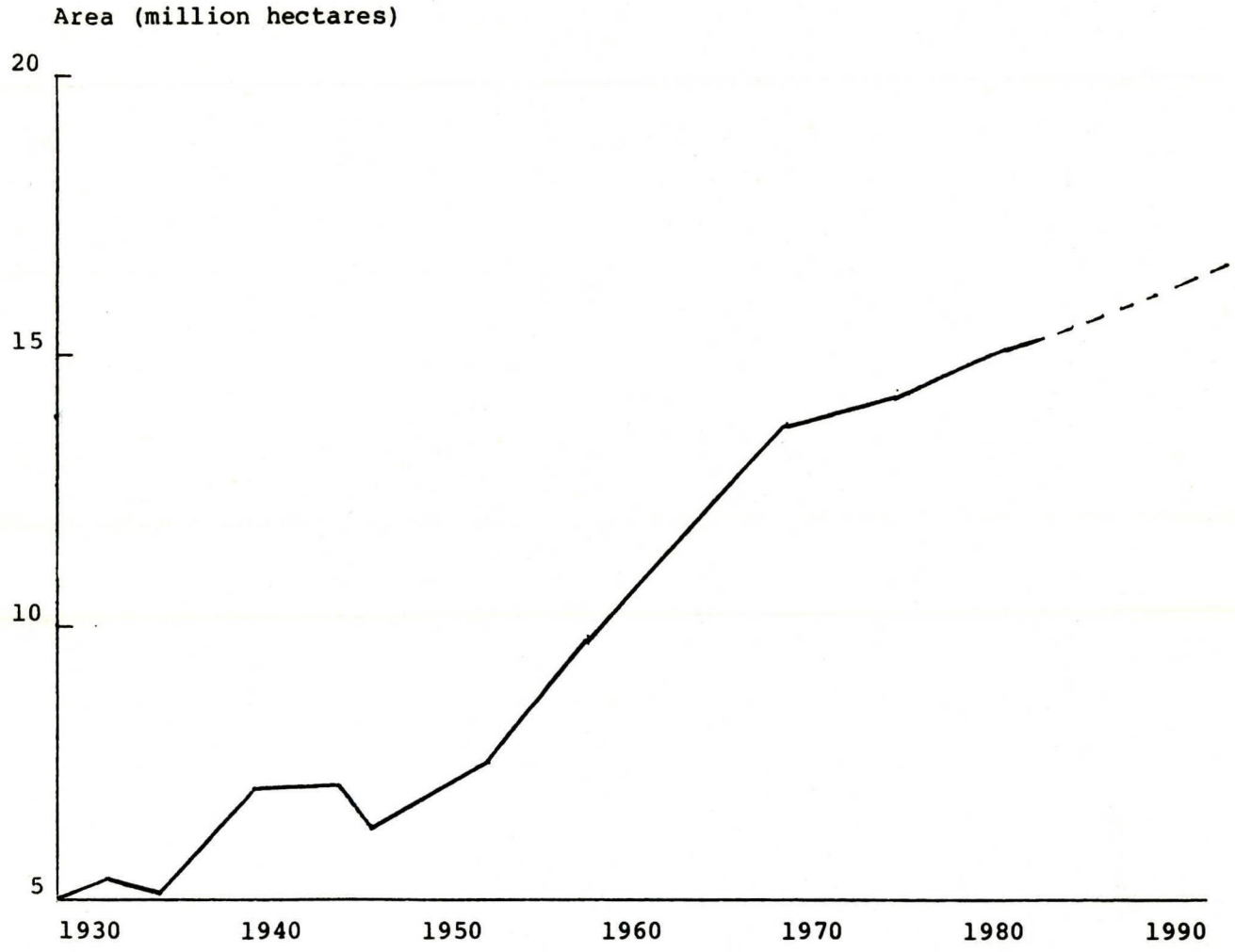

FIGURE 1 - The cleared area used for agriculture in Western Austalia, showing the rapid rise during the 1950s and 1960s, the slowing down during the 1970s and the expectation through to 1990.

With the emphasis on cereal growing and sheep production it is understandable that the type of farming in Western Australia differs from that of other States. The actual number of farm units within the State is relatively small, but this is counterbalanced by their large size and high mean value of production per farm.(Table 1)

TABLE 1

RELEVANT STATISTICS ON THE SIZE AND PRODUCTION CAPACITY OF THE AGRICULTURAL "UNITS" IN THE VARIOUS STATES

	N.S.W.	VIC.	QLD.	S.A.	W.A.	TAS.	AUST.
Number of agricultural enterprises (1977/78)	50 852	48 104	33 947	19 994	16 871	6 016	175 784
Mean area of holdings (Freehold tenure) - hectares 1977/78	562	290	943	340	1 113	438	588
Mean value of production per holding (1975/76 to 1977/78)	39 362	29 007	40 273	23 823	58 385	28 308	37 635

The relatively small number of farms in Western Australia does not mean however that the operations of the Department and other institutes can be held at a commensurate level. A research function is one which is related to production or production potential, while extension and regulatory activities relate both to production and farm numbers. This principle was accepted by the Commonwealth Grants Commission in its 1981 report.

The institutes involved in research - some between State comparisons

A number of institutes are involved in rural research in Western Australia, the principle one being the Department of Agriculture. Staff of the Institute of Agriculture, University of Western Australia, undertake research in the specific disciplines of agronomy, soil science, plant nutrition and animal production, while veterinary research is undertaken at Murdoch University. Some research is undertaken at Muresk Agricultural College which forms part of the Western Australian Institute of Technology.

Table 2 gives details as to the geographic distribution of the national rural research manpower in accordance with employing groups Commonwealth, State or tertiary institute.

This particular Table is based on data derived from Project Score which is essentially a survey of Australian scientific manpower and expenditure conducted by the Commonwealth Department of Science and the Environment every three years.

From Table 2 it is apparent that some 75 per cent of the rural research activities in Western Australia were being undertaken by the Department of Agriculture, with the contribution from CSIRO being but a small proportion of the total research effort at that particular time (1976/77). It is now significantly less. In other States the CSIRO contribution to the overall within State research effort is much higher.

The CSIRO level of activity in rural research has never been high in Western Australia as compared to other States. It was more substantial ten years ago when the Division of Plant Industry maintained a group in the State. A change of policy and a Divisional restructuring in the early 1970s resulted in a steady withdrawal of CSIRO from the rural research scene in the State. Currently of the 600 or more full time professional CSIRO research staff working on agricultural or pastoral projects in various parts of Australia only about 10 are permanently based in Western Australia, while others conduct some research on a visiting basis. There are also some research staff undertaking environmental or land use studies in Western Australia and some of this work has a marginal interest to agriculture.

TABLE 2

NUMBERS OF RESEARCH SCIENTISTS ON A STATE BASIS IN 1976/77, THE DATA BEING DERIVED FROM A COMMONWEALTH DEPARTMENT OF SCIENCE AND THE ENVIRONMENT SURVEY (PROJECT SCORE)

Research Scientist Man Years.

	NSW.	VIC.	QLD.	S.A.	W.A.	TAS.	ACT.	N.T.	OTHER	TOTAL
*Commonwealth organisations	186.0	75.0	122.0	56.0	23.0	5.0	161.0	18.0	6.0	652
+State organisations	472.0	299.0	362.0	97.0	114.0	50.0			2.0	1 396
Universities, etc.	182.0	113.0	114.0	108.0	66.0	11.0	52.0	18.0	8.0	2 694
Per cent Australia total scientists	31.2	18.1	22.2	9.7	7.5	2.5	7.9	0.6		
Per cent Australia total production 1975/76 - 1977/78	30.0	21.2	20.5	10.4	14.8	2.6				

* The Commonwealth "organisations" conducting research refers almost exclusively to the CSIRO.

\+ State "organisations" are 98 to 99 per cent Department of Agriculture except in New South Wales and Victoria where the Soil Conservation Service accounts to some 11 and 9 per cent respectively.

Western Australia is clearly one of the States with most potential for future development. Its export earning potential is of importance to all Australians. It is unusal therefore that an organisation such as the CSIRO, one of whose prime functions is to research the development of Australia's natural resources, has been, and is now, so poorly represented in the State.

The CSIRO has been subjected to some criticism in Western Australia at various times for its relative lack of activity in rural research within the State. The criticism has come largely from farmer groups. The answer has been that the organisation undertakes "national" research, the results of which are applicable across Australia. Undoubtedly this assertion is correct for part of its agricultural research programme, indeed its contributions in areas such as textile research, animal health and biological control of pests have been outstanding. However, overall its claim is not acceptable. Generally agricultural research differs from physical, chemical or even medical research in that the results are directly applicable mainly to the region where the projects are undertaken, and perhaps also to other relatively close or similar regions, but they are not necessarily of relevance in more distant environments. Even where the broad principle applies the work has to be repeated in other environments.

CSIRO has a large research staff in Canberra (Table 2). No doubt CSIRO would claim that this centrally based staff are doing truly "national" research. In fact is is quite apparent to knowledgeable observers that it is not. A substantial part of the research is agronomic, and is of benefit to graziers and farmers in A.C.T. and surrounding areas of New South Wales but of little benefit to Western Australian producers. However, even if expenditure in Canberra was excluded from the calculations it is clear that Western Australia is seriously disadvantaged by the present status quo in terms of the Commonwealth (mainly CSIRO) rural research effort. This underlying problem forms the basis for much of the comment which follows in later parts of this submission.

Table 2 gives details also on the distribution of university research in agriculture. This research is also partly funded by the Commonwealth and the Table indicates a relatively low 10 per cent of the total being undertaken in Western Australia. Certainly the discrepancy with university research is no where near as great as the discrepancy with CSIRO research, but nonetheless the lack of activity from both groups in Western Australia is a problem.

Partly as a result of this lack of input from other organisations the Department of Agriculture in Western Australia has developed along different lines to those in other States, in that it devotes a higher proportion of its available resources to research as compared to its other prime functions of extension or regulation. This is illustrated by the data of Table 3 which was prepared for the Grants Commission hearings of 1980.

TABLE 3

THE RATIO OF EXPENDITURE ON RESEARCH, EXTENSION AND REGULATION IN FOUR AUSTRALIAN STATE DEPARTMENTS OF AGRICULTURE

	Research	Extension	Regulation	Average 1977/78 to 1979/80 Total Department Expenditure
	(%)	(%)	(%)	($m)
N.S.W.	41	24	35	52.50
QLD	33	25	42	43.24
W.A.	51	30	19	26.76
TAS.	32	32	36	11.15
FOUR-STATE TOTAL	40	26	34	133.69

Table 3 indicates that proportionately the expenditure on extension activities in the Western Australian Department of Agriculture is about the same as that of other States. The divergence comes with research and regulatory activities.

In part, the proportionately low level of regulatory activities is due to the small size of the horticuluture and dairying industries, both of which normally require heavy inputs. Also the Departments in New South Wales and Queensland undertake meat inspection and this is not a function of the Department in Western Australia.

The emphasis on research comes, as mentioned earlier, partly because the Department has little support, and partly as a requirement stemming from the environment and technical isolation of Western Australia relative to other States.

Some specifically Western Australian problems with rural research

The Department believes that agricultural research should be undertaken in the regions where the stock graze and the crops grow, and in line with this philosophy it is establishing currently seven regional research centres. It is developing its regional research policy to the maximum commonsurate with its relatively small total staff establishment.

The Department recognises that there is a widely held view that the best research is undertaken where the best or the most research scientists are located even though they may be separate from the problem or the industry. This has resulted in the concentration of scientists in central groups. The centralisation of the CSIRO for example, has resulted in there being more agricultural research scientists in the Australian Capital Territory than in Western Australia (Table 2).

Aspects of this centralisation philosophy as they relate to CSIRO activities have been outlined earlier. There are other aspects of importance relating to the transferability of rural research. These are outlined as they highlight the need for some action to adjust an out of balance situation detrimental to the interests of the national research effort.

The agricultural areas of Western Australia are situated largely in a "Mediterranean" climatic zone and in this respect there are some similarities to parts of the South Australian agricultural areas. Much of New South Wales and Victoria also have winter rainfall peaks but the climate is different in that the rainfall is more evenly distributed throughout the year and summer temperatures are significantly lower.

Annual crops and pastures form the basis of the agricultural systems across much of southern Australia, and this particular group of species show extreme sensitivity to moisture and temperature regimes both summer and winter, much more so than the more tolerant perennial species which are used over most of the variable climatic conditions of Europe and North America.

Perhaps, however, the major complicating factor for the agricultural industries in terms of the transferability of scientific information comes with the soil variability. In its agricultural areas Western Australia has the most inherently infertile soils in the Commonwealth. The major newly developed agricultural regions on the south and west coasts are largely sands, while some 60 to 70 per cent of the soils in the medium and low rainfall cereal growing districts are also sands or gravelly sands low in natural nutrients and with soil acidity problems.

In the other States of Australia the soil types are overall much more fertile. They cross State boundaries to a significant extent, so making the research results of one State in whole or in part applicable to the neighbouring State. Western Australian agricultural soils have no counterparts in other States except for extremely limited areas in South Australia. The soils of Kangaroo Island and parts of the Eyre Peninsula are similar to the sands or gravelly sands of Western Australia. These soils form, however, only a minor part of the soils of that State and as much are poorly researched.

The rapid clearing of these low fertility mainly sandy surfaced soils has resulted in some extremely serious problems which are almost exclusive to Western Australia. These relate to dry land salinity and widespread wind erosion.

Natural salinity occurs in many parts of Western Australia in coastal marshes and in saline drainage lines, particularly in the arid or semi-arid interior. The salt originates mainly from rainfall which near the coast may carry concentrations as high as 50 mg per litre.

Over a long period of time salt accumulation has taken place and even in some non-saline soils there may be up to 1,800 tonnes per hectare. Prior to the development of these soils for agriculture, the salt content was in balance, with the discharge into the drainage lines balancing the input from rainfall.

With the development of agriculture two quite distinct salt problems have emerged, one on dryland and relatively unique to Western Australia, the other in irrigated areas with some parallel in other States.

In the dryland situation an important problem following clearing is the development of secondary salinity withthe redistribution of the stored salts. Redistribution may be due to an upward movement of salts in the soil but is more commonly associated with the discharge of saline groundwaters and the subsequent transport of salts in the stream flow.

The original native vegetation of mainly evergreen shrubs had a deep root system extending beyond one metre. It extracted a larger quantity of water as compared to the shallow rooted annual crops and pastures. The removal of this vegetation has increased the recharge through old root channels to a brackish acquifer above the partly decomposed basement rock, the result being a rise in the underground water table bringing with it to the surface the stored salts.

There is estimated to be some 170,000 hectares of saltland in Western Australia which was formerly used for crops and pastures. It represents some 1.2 per cent of cleared land which in wheat sales alone represents a loss of more than $3 million annually.

There is reason to believe that the recently developed saline soils and water supplies will gradually return to a balance with some noticeable improvement possible after 20 to 30 years but a full stability and the establishment of a new salt balance could take up to 400 years.

In other countries with similar climates, vegetation and geographic location, e.g. Spain, there is no salt problem in the soils or streams. Clearing in Spain took place gradually over 1,000 years or more and was largely completed some 300 years ago. There was no dramatic broad scale upset to the overall saline balance in the soil and water, and any minor local saline development has long since returned to a balanced situation.

It has been necessary to establish a substantial research and advisory group within the Department to investigate dryland salinity. There is little information to be gained from other States where the problem either does not occur or is relatively minor.

Wind erosion on the southern sandplain soils extending from Albany to east of Esperance is a further more recent problem. In this major agricultural region some 1.5 million hectares has been cleared in the past thirty years and it is unfortunate that it is a region of frequent strong winds. At Jerramungup between June and August 1980 a total of 23 gale force or near gale force winds were recorded.

In more recent years farmers in the region have turned more and more cereal growing and this has increased the problem. In the Jerramungup shire in 1981 some 40 per cent of the cleared land was cropped and with many of the new farmers under considerable financial presure, this situation is expected to continue.

Estimates from the three Department offices in the region supported by data from the Landsat satellite, indicate that some 40 per cent of the total area experienced erosion in the past two years with more than 20,000 hectares being eroded severely to the extent of soil blowouts and drifting dune development.

The interaction of climate and soil provides the basic ecosystem within which crop and pasture species must grow and animals must graze. The markedly different result of the interaction in Western Australia as compared to the agricultural regions of the other southern States causes not only differences in crop growth per se, but also differences in the pest and disease complexes. The pests and diseases attacking crops and pastures and animals in southern Western Australia differ substantially from those of the other southern States in terms of population composition and seriousness of the individual population components.

A classic example of the effect of environment on pest problems occurs with sheep blowfly strike. This serious problem causes losses of some $60 million to the Australian sheep industry each year, and until recently it was thought that the problem was the same in all southern States. Recent research in Western Australia has shown, however, that 20 per cent of the single species strikes in the State are caused by an exclusively local species *Caliphora albifrontalis* while 50 per cent of the combined strikes involve a predominantly local species (*C. nociva*). In the eastern States the most important body strike pre-condition is fleece rot while in Western Australia it appears that mycotic dermatitis is more important.

These major differences between States on species and general blowfly ecology have important implications in terms of control programmes, and in this respect Western Australia is in the better position, for the two local species appear to have not yet developed resistance to insecticides to the same extent as the main strike species in the eastern States (*Lucilia cuprina*). This new knowledge has enabled modifications to blowfly control recommendations in Western Australia which are of substantial benefit to graziers.

The net result of these differences across the whole spectrum of rural research is that only a relatively small part of the research undertaken in other States is usable in Western Australia whereas among the other States the proportions usable from State to State are much higher. Western Australia is therefore under a distinct disability as compared to other States. In research it has extensive problems which no one else in Australia is working.

This is such a critical point that it is worth illustrating further from investigatons which have examined the question in some depth in a particular industry. Fels and Quinlivan (1977)* undertook an investigation of the technological basis of the sheep industry in Western Australia which represents some 25 per cent of the national total. This industry is common to all States and thus it would be expected that the practices on which the industry is based would have much in common.

The investigation found that the Western Australian component of the Australian research effort on sheep production amounted to some nine per cent or less of the total, this figure being approximately in line with the proportion of agricultural scientists working in the State. By contrast, however, some 65 per cent of the Australian developed technology being used in Western Australia could be traced back to local research and only 35 per cent to research in other States. In other words 65 per cent of the technology came from the nine per cent local research and 35 per cent from the 91 per cent research undertaken in other States. Local research therefore was 17 times better in terms of pay off to the grazier in Western Australia as compared to research in other States.

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* Fels, H.E. and Quinlivan, B.J. (1978) - Value for money in rural research - an analysis of the research and development background to the present practices in the Western Australian sheep industry. Dept. Agric. West. Aust. Misc. Bull. October 1978.

The object of the exercise as outlined was not to prove a lack of transferability of research results across State boundaries and in particular to Western Australia. Rather it aimed in the first instance at establishing the value to the industry of research done within the State. There was no suggestion that the standard of the research in Western Australia was any better or for that matter any worse, than that undertaken in other States. However, by inference it is clear that much of the research undertaken on sheep industry problems in other States had little or no application in Western Australia.

The Senate Committee perhaps has received or will receive submissions from organisations presenting contrary basic philosophies to those outlined. Hopefully, the comments and examples as given will be informative on problems specific to Western Australia and enable a more balanced judgement on this very important question of the geographic location of the national rural research effort.

The Department extension services

The Department of Agriculture is certainly the main organisation operating in the rural extension field in Western Australia, but is is not the only one. Over the past two decades in particular there has been a significant development of private extension services which have taken several forms, some related to specific industries, others more generalised.

The past two decades have seen also the development of private farm management consulting services. Some of these specialise in management aspects while others provide advise on fertiliser and pesticide inputs. These latter work at times on the basis of retainers from the chemical companies.

These and other developments of similar type, and the important part played by the rural press, radio, and television in the overall rural extension activities needs to be acknowledged. It is difficult to define precisely the proportionate level of this activity on a cost input or effectiveness basis but it would be substantial, perhaps amounting to some 20 per cent of the overall extension activity.

The Department of Agriculture is responsible for the remainder of the rural extension effort within Western Australia. It is the only government organisation operating in this field. To achieve its extension objective it maintains advisory staff at 22 district offices. This staff totals 230 including 94 professionals (agricultural scientists and veterinarians).

Extension services along the same basic lines as those provided by the Department are operating in practically every country in the world. The governments of virtually all non communist countries have recognised the desirability of maintaining a viable agricultural sector based on the family farm. They have recognised the necessity for maintaining efficient farming systems compatible with the preservation of natural resources, and have accepted that a strong extension service is the best way of achieving these aims.

The Department's extension function, which accounts for some 30 per cent of its CRF expenditure, can be likened in large part to a teaching role. In teaching occupations the numbers of teachers required is determined substantially by the number of students. With rural extension, however, there are other factors operating. Farm size and productive capacity are important. The Department looks to the well being of industries as a whole, and for maximum efficiency directs its services as far as possible in accord with productive capacity.

A feature of the local extension scene which is somewhat peculiarly Western Australian relates to the nature of the advisory district. It is generally accepted that in newly settled districts the call for advisory services is higher than in the older districts, and with most of the farming land (and farmers) of Western Australia being relatively new the call on advisory services within the State is possibly proportionately higher than in other States.

If production resources remain static in real terms the Department does not see a requirement for an expansion of its current extension services in terms of the proportion of persons employed. It recognises that the future will bring rapid technological change in information dissemination. These innovations should allow more effective extension services with the same staff. If production resources expand there are obvious advantages in a larger service being provided.

On farm computers with direct connections to data and information banks are a probability. Already view data systems of this type are in the advanced experimental stage in some 15 countries with the British "Prestel" system currently being the only one in commercial use. At this stage, it is possible only to conjecture as to the likely effect of these innovations on the traditional extension and diagnostic services. It is possible they will result in an increased overall demand for a modified or restructured service from both the public and private sectors. In such a situation the restructured government service may not necessarily require the same manpower input in the same areas.

This likely changing pattern raises a number of questions which are relevant to all Australian States and to the Commonwealth as well. These are discussed later in the submission.

THE OVERALL NATIONAL RESEARCH AND EXTENSION PROGRAMMES

Although the Terms of Reference for this Senate Committee enquiry specifically mention the Commonwealth's involvement in rural research and extension, it is perhaps appropriate to discuss this involvement as it relates to the overall national effort.

In the first instance it is appropriate to resolve some common misunderstandings, and one of these is that Australian rural industries have in the past been supported generously in research funding. This supposed generous support has at times been justified mainly as a compensation by the Commonwealth for the disabilities imposed on the rural industries by the heavy tariff protection given to the manufacturing industries.

There is no doubt that the disability resulting from the tariffs is real amounting as it does to hundreds of millions of dollars. The "compensation", if such it be, has by contrast not been generous, for even at best Australia has never been high up the scale in terms of Commonwealth spending on research. It has always formed a minor part only of the total expenditure. The extreme inbalance for the farmer between "losses" due to tariffs and "gains" due to Commonwealth expenditure on research is well known. Undoubtedly it will be quantified and drawn to the attention of the Committee by others.

Comparative recent expenditure figures for agricultural research per se are difficult to find but some figures collated by the Senate Standing Committee of Science and the Environment on research expenditure in the "natural sciences" (which includes agriculture) are relevant. These were published in the report - Industrial Research and Development in Australia, 1979 and are given below as Table 4.

TABLE 4

G.E.R.D. PER CAPITA AND AS A PERCENTAGE OF G.D.P. IN O.E.C.D. MEMBER COUNTRIES 1975
(NATURAL SCIENCES ONLY)

Country	Population (million)	GERD US $ b	GDP Per Capita ($)	GERD Per Capita ($)	GERD % of GDP
Australia	14.00	0.89	6819	64	0.9
Austria	7.52	n.a.	4996	n.a.	n.a.
Belgium	9.80	0.76	6352	78	1.2
Canada	22.73	1.70	7181	75	1.0
Denmark	5.06	0.40	7009	79	1.1
Finland	4.71	0.23	5641	49	0.9
France	52.70	5.99	6352	114	1.8
Germany	61.38	8.85	6769	143	2.1
Ireland	3.13	0.06	2571	20	0.8
Japan	111.52	8.77	4404	79	1.7
Netherlands	13.65	1.06	6052	78	1.9
New Zealand	3.09	0.11	4365	74	0.8
Norway	4.01	0.26	7072	65	1.0
Portugal	9.63	0.04	1560	4	0.2
Spain	35.81	0.26	2892	7	0.3
Sweden	8.19	1.22	8425	149	1.8
United Kingdom	55.98	4.65	4095	83	2.1
United States	213.56	35.19	7148	165	2.3

G.E.R.D. - Gross expenditure research and development
G.D.P. - Gross domestic product

Australia is well down in the list of OECD countries in terms of its expenditure ratios on research being significantly ahead only of Spain and Portugal. Both these countries are categorised as poor or underdeveloped for they are or recently have been the recipients of major aid programmes though the World Bank, FAO and UNDP.

Perhaps a more valid comparison is with a country of similar size in terms of population. In this instance the comparison with Holland is not particularly favourable to Australia (Table 4).

Perhaps the data of Table 4 should dispel also once and for all, any misconceptions regarding the overall research situation in Australia, rural and otherwise. There is no doubt that Australia considers itself to be a technologically advanced country with a sophisticated well-developed research base in the sciences. It would appear however, that in the natural sciences the overall national effort is a very ordinary one indeed.

It is unfortunate that the most recent comparison on purely agricultural research is that of the Industries Assistance Commission as published in their 1976 report. The data for Australia however is for 1973/74 or earlier and thus is somewhat dated at this stage. The relevant statistics are given in Table 5.

TABLE 5

A COMPARISON OF EXPENDITURE ON RURAL RESEARCH AND DEVELOPMENT IN DIFFERENT COUNTRIES IN TERMS OF ITS RELATION TO GROSS RURAL PRODUCT

Country	Calendar Year	Gross Rural Product (GRP)	Total Exp. On Rural R & D	Total Exp. On Rural R & D as % of GRP
Australia	1971-72	4 239	101.4	2.40
	1973-74	6 646	140.2	2.11
Austria	1970	901	1.6	0.18
Belgium	1971	911	14.1	1.55
Britain	1959	2 573	38.8	1.51
Canada	1971	3 062	151.0	4.93
Denmark	1970	1.048	15.1	1.44
Finland	1971	1 237	6.9	0.56
France	1971	8 276	53.7	0.65
Federal Republic of Germany	1971	5 679	104.2	1.83
Greece	1971	1 539	3.6	0.23
Ireland	1971	554	8.8	1.60
Italy	1971	7 534	19.5	0.26
Japan	1971	11 608	216.4	1.86
Netherlands	1971	1 696	34.0	2.00
Norway	1970	642	11.2	1.74
Portugal	1971	920	0.2	0.20
Spain	1970	3 632	0.4	0.10
Sweden	1971	1 355	21.1	1.56
United States	1971	27 562	900.0	3.27

The ratios of importance in Table 5 are those relating to Canada and the United States. Both these countries are major exporters and thus are comparable to Australia. At the time in both instances their expenditure on research, and development as a proportion of their gross rural product was much higher than that of Australia.

Of much more significance is a consideration of the ratio applicable at the present time. The most recent expenditure figure on rural research and development in Australia is for 1979/80 when it approximated $200 million (Report of the Commonwealth Council for Rural Research and Expenditure, 1981), while the gross value of rural production for 1979/80 has been given as $11,875 million (Australian Bureau of Statistics - Quarterly Review February 1981).

The latest ratio is therefore $\frac{200}{11870} = 1.68$ which is substantially below that of 1973/74 (2.11, Table 5). At this relatively low ratio, Australia is in much the same category as many countries with long established non exporting rural industries where the requirement for research would naturally be lower. Thus, as with the general natural sciences, Australia's current rural research effort could be classed on the international scale as mediocre at best.

A further common misconception regarding Australian rural research and extension relates to who are the beneficiaries. Strangely there appears to be differences in the mind of the public in this context between research in the manufacturing and the rural industries. A technological advance in motor car manufacturing for example, is recognised as conferring benefits on the consumers in large part in the form of lower real prices or improved performance. By contrast the public appears to consider that the beneficiary of rural research is the farmer and the farmer only.

There is no real evidence to differentiate significantly the benefit flow from manufacturing or other forms of research from that of rural research. The probability is that the proportionate benefit to producer and consumer is the same in both instances.

The real reduction in support for rural research in Australia in recent years needs to be construed in this light in part at least. If research funding is to be restricted the efficiency and effectiveness of the 170,000 odd Australian farmers will be lower. Consequently, the rate of quality improvement for food products on offer to the 14 million non-farmer Australians will be slowed and the relative price of these goods will rise.

Strangely the Industries Assistance Commission in its 1976 report tended to negate the argument that the community as a whole benefits from rural research. They agreed that consumers benefited with producers but as some of the consumers were in overseas countries the benefit was largely lost. Their view in this context lacks rationality for there still remains in Australia approximately 90 consumers for every producer.

The Commonwealth involvement in rural research

In the document outlining the Terms of Reference one of the questions raised related to the constitutional and economic basis for Commonwealth involvement in rural research and extension. Constitutional issues are not the concern of a State Department of Agriculture, but economic issues certainly are.

Earlier some of the peripheral reasons for Commonwealth involvement have been mentioned e.g. compensation for tariff costs, but there are others of much more significance and these relate to Australia's overseas trade.

It should not be necessary to state the obvious that the relative prosperity of Australia or for that matter any country, and of all members of its community, depends substantially on its export sales. In this day and age exports are a key factor, to such an extent that many countries provide heavy export subsidies. By contrast the major Australian export industries agriculture and mining are required to sell their products on a world market without assistance and frequently through tariff barriers.

Agriculture is the major export earner for Australia with approximately 90 per cent of the rural production being exported. Table 6 gives details as to the relative positions of the agricultural, mining and manufacturing industries with the situation over the past ten years being relatively stable although if anything perhaps there has been a slight decline in the proportion of agricultural exports.

TABLE 6

Contribution of major sectors to GDP and to exports

Year	Gross domestic product a	Contribution to GDP by				Total exports b	Contribution to exports by		
		Agriculture, fishing, forestry	Mining	Manu-facturing	Tertiary		Agriculture, fishing, forestry	Mining	Manu-facturing and other
Average of 3 years ended	$m	%	%	%	%	$m	%	%	%
1953-54	7 502	19	2	27	52	1 567	84	7	9
1963-64	14 618	13	2	27	58	2 311	79	7	14
1966-67	18 820	11	2	27	60	2 701	72	11	17
1969-70	24 591	9	2	26	63	3 382	59	20	21
1971-72	33 835	7	4	24	65	4 719	52	25	23
1972-73	38 486	8	4	23	65	5 961	57	22	21
1973-74	45 967	9	4	23	64	6 673	54	24	22
1974-75	55 088	7	4	22	67	8 420	48	28	24
1975-76	64 127	6	4	21	69	9 303	47	31	22
1976-77	73 465	6	4	21	69	11 350	47	31	22
1977-78	79 934	5	4	21	70	11 878	46	31	23
1978-79p	89 034	7	na	na	na	13 785	45	28	27
1979-80p	99 666	7	na	na	na	18 221	47	25	28

a At factor cost. b Total Australian produce excluding gold. p Subject to revision. r Revised. na Not available.

Sources: Australian Bureau of Statistics, Bureau of Agricultural Economics and Department of Trade and Resources. Quarterly Review of the Rural Economy 3(1), February 1981.

Despite this apparent stability it should not be assumed that all is well with the rural industries in terms of their future capacity to export. Steadily over the past 20 years the terms of trade have gone against rural producers and this is evident from a study of Table 7 wherein the ratio of prices received by farmers to prices paid has moved erratically, but the consistent trend is a decline.

TABLE 7

GROSS RETURNS, FARM COSTS AND NET RETURNS AND INDEXES OF* PRICES RECEIVED AND PAID BY FARMERS

Year	Gross value of rural production	Farm costs	Net value of rural production	Index of prices received	Index of prices paid	Ratio of prices received to prices paid
Average of 3 years ended	$m	$m	$m	No.	No.	No.
1953-54	2 182	1 136	1 047	105	82	128
1963-64	3 031	1 875	1 155	102	101	102
1966-67	3 486	2 250	1 235	108	109	99
1969-70	3 645	2 595	1 051	105	120	88
1971-72	3 968	2 705	1 263	106	133	80
1972-73	4 957	2 997	1 960	144	143	101
1973-74	6 412	3 393	3 019	168	165	101
1974-75	5 877	3 933	1 944	148	215	69
1975-76	6 173	4 351	1 822	155	251	62
1976-77	6 756	4 718	2 038	173	281	62
1977-78	6 999	4 943	2 056	179	310	58
1978-79	10 287	5 847	4 440	218	332	66
1979-80	11 875	6 655	5 220	259	370	70
1980-81	11 870	7 270	4 600	290	415	70

The decline in the terms of trade for farmers is a serious matter, for inevitably it reflects a developing situation of non profitability.

One of the major factors which has slowed this rate of decline over the past few decades has been the availability of new technology emanating from rural research. Without this research support some significant part of our farming and pastoral industries would already be non competitive on world markets.

* From Bureau Agric. Econ. - Quarterly Rev. February 1981

Clearly therefore in the interests of the community at large the Commonwealth must involve itself in the rural research situation. It has a prime responsibility to ensure that the level of research support for the rural industries is adequate to at least maintain Australia's competitive export situation.

It should be noted in this general context that there is a time lapse between the undertaking of research and its application, the benefits of a higher level of research, for example becoming apparent as much as 10 years later. The reverse applies also with the disabilities of a lower research input appearing after a lapse of some years.

Substantially, it is a matter of judgment as to the precise level, and type of support which is required minimally, but it could not be assumed that the current level is sufficient nor that it would be safe to cut further. If anything the evidence infers the contrary. The higher level of research in the 1960's and early 1970's enabled stable or slightly declining profitability in the later 1970's. The lower level of research from the mid 1970's may well be followed by low profitability in the late 1980's. The major export trades of wheat, wool and meat may well be at risk, and certainly it cannot be assumed if the research situation remains as is, that Australia will still be able to rely on half its exports coming from the rural industries in the 21st century.

Turning now to the specific Commonwealth involvement in rural research in recent years, it is evident from Table 8 that the decline in support has been sharp. In 1973/74 the Commonwealth spent $59 m on rural research*, and if this figure is adjusted on the basis of the Consumer Price Index the Commonwealth should have spent $115 m in 1979/80. Instead it spent only $76 m** or some 35 per cent below the level of five years previously in real money terms.

* IAC Report, 1976

** Science Statement 1980; CCRRE Report 1980/81

TABLE 8

EXPENDITURE ON RURAL RESEARCH IN RELATION
TO THE CONSUMER PRICE INDEX (CPI)

	CPI 1966 base Year = 100	% inflation	Commonwealth exp. ($m) Actual +	1973/74 expend. adjusted to 1979/80 on basis of CPI movements	Total national exp. ($ m) Actual	1973/74 expend. adjusted to 1979/80 or basis of CPI movements
1973/74	147	12.9	59		150	
1974/75	171	16.7				
1975/76	193	13.0				
1976/77	221	13.8				
1977/78	241	9.5				
1978/79	261	8.2				
1979/80	287	10.2	76	115	200	293

- Note - 1973/74 data from Industries Assistance Commission Report 1976; the Project Score figure for the same year was $165 m.

+ Actual expenditure does not include Commonwealth contributions to rural research trust funds although these contributions are included in the total expenditure figure.

From Table 8 it is evident that not only has the Commonwealth expenditure on rural research declined, but so also has the overall national expenditure in real terms. Some 60 per cent of the total fall is attributable to the Commonwealth, and as CSIRO is the main vehicle for the expenditure of Commonwealth research funds, clearly therefore the fall in Commonwealth rural research expenditure is mainly a reflection of the reduced CSIRO rural programme.

As outlined earlier in this submission Western Australia benefits from some of the more basic CSIRO research but not to any extent from the more applied programmes which form the major part of its activity, for the organisation is virtually not represented in the rural scene in the State. With the present distribution of the CSIRO research activity it is difficult for the Department to support any proposal to boost the level of CSIRO research if there is not a substantial input into Western Australia.

The Department believes there should be a greater Commonwealth involvement by way of funding for research generally but if this is to happen and be channelled through CSIRO a more rational geographic distribution of their staff is essential. The same principle applies even if the CSIRO involvement in real terms remains as is or falls further.

The rural industry research funds

The Terms of Reference for the enquiry list for discussion questions relating to the rural industry research funds in terms of type of research being supported, priorities, and funding mechanisms. In general the development of these funds over the past two or more decades represents the brightest note in the entire rural research scene. They have developed as the rural industries of Australia have matured and accepted that they have a responsibility for in house research in the same way as some of the large secondary industries.

Clearly no single farmer or grazier has been or will be in a position to establish his own research establishment, and thus the communal or cooperative approach is needed. For the time being the funds available are being channelled in the main into the existing establishments e.g. Departments of Agriculture and universities but undoubtedly there is scope within the general framework for other institutes to be established as development of the concept proceeds.

The funds have committees with strong grower representation and the Department believes this to be a desirable situation. Growers can satisfy themselves that the research which is supported is realistic, and along practical lines of direct benefit to the industry. The research scientists and the institute are directly accountable to the industry.

However, in terms of the finance available through the funds the current situation leaves much to be desired. The rural industry research funds distributed $23 m in 1973/74 and this had risen to $29 m in 1980/81. If the rise had been proportionate to the change in the Consumer Price Index some $50 m would have been available. The problem stems from there being no established procedures for adjustment.

All rural industry levies for research are based on a fixed sum per unit of production except for the wool tax which is levied as a percentage of the value of shorn wool. With most of the funds, levy adjustments are carried out at widely spaced intervals, with the wool levy being last adjusted in 1974/75. The wheat research levy was adjusted in 1978 while that for meat research (sheep) was adjusted in 1979 from a previous level set in 1966. The level for meat research (cattle) has not been adjusted since 1971.

These irregular adjustments have over the years changed the critical ratio of research expenditure to industry value. This can be seen when statutory industry levies are compared to the value of the industry at a fixed point in time. A comparison of this type was undertaken for the Industries Assistance Commission enquiry into rural research. A comparison of these IAC data for 1973/74 as listed, with those estimated for 1980/81 is given in Table 9.

TABLE 9

LEVY COLLECTIONS FOR THE RURAL INDUSTRY RESEARCH FUNDS AS A % OF VALUE OF PRODUCTION OF THE INDUSTRY

Industry	1973/74 Levy	1980/81
Chicken meat	0.10	0.07
Dairying	0.10	0.06
Dried fruits	0.15	0.10
Meat	0.16	0.10
Pig	0.15	0.08
Poultry	0.10	0.07
Tobacco	1.11	0.9
Wheat	0.07	0.16
Wool	0.53	0.33

In every industry except wheat the situation is that the levies being collected now reflect a sharp decline over the past seven years relative to the value of production - by 50 per cent or more in most instances.

The situation with the wheat industry is unusual in that 1973/74 was a very good season, in fact the best to that point in time, and wheat prices were high. As such the ratio percentage at 0.07 was low. By contrast the 1980/81 season followed a levy adjustment in 1978. It was a drought year and wheat prices were relatively low. The two factors resulted in a high ratio percentage for 1980/81.

The evidence is that the rural research trust funds are not contributing in real terms to the national research effort to the extent they were some seven years ago. Effectively they are tending to decline in line with the overall funding available for rural research.

This decline is not due to any lack of willingness on the part of the various farming organisations to support research. Indeed as is evidenced by the recent public debates over the proposed increase in the wheat levy the farming community in general supports the principle of industry levies for research. The decline is due more perhaps to the erratic irregular adjustments and perhaps to a significant degree also a purposeful disinterest on the part of the Commonwealth.

If the Commonwealth is prepared to take a long sighted view it would see that in the rural industry trust funds it has the means of establishing for the 21st century a stable and acceptable system of funding a significant proportion of the national rural research. The willingness of the various industries to approve levies indicates their accceptance of a responsibility to fund research and indicates their developing maturity and sophistication.

With purposeful fostering there is every reason to believe that over a period of years the various industries would be prepared to raise substantially their proportionate contribution, and development along these lines should be encouraged to the maximum by the Commonwealth. Matching funds should always be available. There is a strong case to take this principle beyond the matching situation even to, say, a 2:1 basis, in order to encourage small industries to participate. If this is not done these industries may not have a meaningful research fund to allocate.

Effectively these Commonwealth funds made available through the various trusts should be the highest priority for Commonwealth expenditure on research, and if necessary the Commonwealth should be prepared to increase their contributions to the funds in a situation where their overall contribution is stable or even falling.

In recommending this approach it is appreciated that in a situation where the Commonwealth funding for rural research was falling, there could be a reduction in direct funding for the CSIRO rural research effort. This would be a serious development which the Department would not wish to see. Nevertheless, if a decision finally has to be made on priorities it is the Department's view that contributions to industry funds should come first.

If the Commonwealth does take up the suggestions as outlined and works purposefully towards the further expansion of the rural industry research funds the Australian rural research scene in 10 or 20 years would rest on a sound basis. It would be well balanced with a high degree of accountability and industry control, with perhaps one third of the total funding being channelled through the industry fund committees.

Even in this situation there would continue to be a major contribution from State sources. This would provide for a large part of the research in the contributing industries and would provide also for all of the research which was inappropriate for industry funds, such as the potential for new crops, general marketing research, etc. CSIRO would be responsible for an input, more specifically in long-term basic research, which must, however, be oriented towards the agricultural industries so that it is directly applicable in problem solving. For instance, genetic engineering, biological control of pests and textile research have a direct relationship to agricultural problems and marketing.

The development of the situation as outlined, could not take place overnight. Indeed some of the small industries at their current stage of development are perhaps not ready to even commence research levies. As such the programming would need to be steady and essentially long term consistent with the development of the industry.

A final comment on the rural industry research funds, and certainly not the one of least importance, relates to the competition factor. In practically any field of endeavour a spirit of competition is good, in research as well as any other occupation. The rural industry research funds if developed as a major component of the research scene would provide the basis for an element of competition between scientists and institutes.

In the context of the previous paragraph it is anomalous that CSIRO has a mandatory right to draw a portion of their funds from the Wool Research Trust Fund without competing with other organisations. This is historical and should be examined carefully by the Committee.

The Commonwealth role in extension

The Commonwealth Extension Services Grant (C.E.S.G.) originated in the early 1950's and was expanded in the mid 1960's. It has made over the years a substantial contribution to the State extension services which are now on a sound footing. The Grant has now ceased but the Commonwealth has made the funds available through the General Revenue Assistance Grant to each State and subject to State Treasury decision from that source to the various State Departments. In Western Australia at least, the State Treasury has added these funds to the Department budget in lieu of the former Commonwealth Extension Services Grant.

Rural extension is an education activity; more specifically it could be described as adult education. While the major responsibility for education lies with the States, there has been a Commonwealth Government policy going back for some decades to assist the States in providing adequate educational services through special grants. This has been particularly apparent since 1972, and over the past decade funds have been available regularly for technical and further education. Against this overall policy it is strange that the Commonwealth has seen fit to cease its involvement in the funding of rural extension.

In the present environment it would seem that the Commonwealth should seriously consider returning to a situation where it provides funds for specific activities, some of which could be listed as follows:-

(i) innovative extension where a research element is involved and for which form of overall guidance and coordination is appropriate e.g. the introduction of data banks for on farm video computers;
(ii) pioneering extension projects undertaken in one State for possible subsequent adoption in all States e.g. carcase classification;
(iii) extension projects in instances where State funds are inadequate to meet the requirements of national priorities e.g. soil conservation or exotic disease control.

In addition to the above there could be further roles in the evaluation of research and extension programmes, in the provision of scholarships for training, and the provision of general training facilities.

The National Projects Portion of the former CESG grant was specifically established to meet these situations. When the Grant was abolished the National Projects Portion was abolished also. Unlike the main part of the Grant it was not allocated among the States, it merely ceased to exist, the beneficiary, if anyone, of the vanished funds, being the Commonwealth.

There is a reasonable case for a grant of this type to be reinstituted. It never was a large amount at $150,000, but it filled a significant gap or need in the overall Australian extension scene.

The Commonwealth Council for
Rural Research and Extension

The Commonwealth Council for Rural Research and Extension was established in 1976 and in its short life of some three years it achievements were not substantial. It is perhaps somewhat unfair however to relate this ineffectiveness to the Council itself or to the staff.

As established the Council never did have a prospect of signficantly influencing the Australian rural research and extension scene. It was established to advise and coordinate, but to do this effectively any organisation needs finance, or needs to be in a position to influence the use of the finance being made available for research and extension.

The Council had insufficient internal finance to undertake effectively a proper monitoring investigatory and advisory role, and it had no control over research funds. Thus its ineffectiveness was inevitable.

The Department would not favour the recreation of the Council if it is to be structured and funded in the same manner. It doubts if there is a role for such a low key organisation in the Australian scene which could not be handled equally effectively by established groups such as the Standing Committee on Agriculture and its various technical committees. These groups at least have the advantage of being more representative of Australian agriculture as a whole.

The establishment of the Council in the first instance was an expression of the continued concern in many parts of the Australian establishment regarding coordination of agricultural research in particular. Expressions such as "fragmented", "disjointed", "fractionisation" and "duplication" have been common. There is a frequent assumption, without any evidence, that rural research must be inefficient because it is conducted by a number of individual organisations spread around the country without any centralised control. It has followed from this assumption that many groups or individuals have tried to get into the act in terms of "managing" or "coordinating" Australian agricultural research.

These ambitions reflect a lack of knowledge on the part of the proposers as to what agricultural research is all about. By its very nature a really creative national research programme would be fragmented, and highly heterogeneous. It is also regional (or perhaps disjointed) in application, and the control must remain substantially at the regional level. It is not a matter which can be centralised. Thus to a degree, the original rationale for the establishment of the Council was not sound. It was based on a beaurocratic concern with central co-ordination rather than with the more positive role of fostering creativity and success, a role it was unable to perform without access to funding.

RECOMMENDATIONS

The views and recommendations put forward in this submission are based essentially on the Department consensus as to what research and extension is required in the future to service the rural industries of Western Australia and these are not seen to be at variance with national goals. The recommendations are summarised below.

(i) The Commonwealth should at least maintain in real value terms, its current level of contributions to rural research on the grounds that further reductions could well place at risk the viability of the major rural export industries.

(ii) The funds the Commonwealth makes available for rural research should be channelled as top priority through the various rural industry research funds.

(iii) The rural industry research funds should be encouraged to increase industry levies substantially, and with Commonwealth assistance, developed to the stage where they become in the 21st century, perhaps the main organisations responsible for the handling of the Commonwealth rural research contribution.

(iv) Funds should continue to be made available to CSIRO for rural research on the understanding that the geographic distribution of their research effort is brought more into line with the distribution of rural production in Australia.

(v) If the Commonwealth Government is to continue its total withdrawal of support for rural research it should give priority to strengthening the funding situation of the rural industry research funds in the first instance, and under these circumstances CSIRO should operate on a lesser budget and confine itself to basic research of true national application.

(vi) The privileged position of CSIRO in being able to draw funds from the Wool Research Trust Fund on a non competitive basis is a historical anachronism and should cease.

(vii) The Commonwealth is not seen as having a major involvement in rural extension, but there is a case for a small Commonwealth input along the lines of the former CESG National Projects Portion to fund projects of national significance and application.

(viii) The Department does not favour the recreation of the former Commonwealth Council for Rural Research and Extension if it is to be structured and funded in the same manner.