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REVIEW OF RESEARCH CENTRES

Report to the Research Policy Advisory Committee

DEPARTMENT OF AGRICULTURE
SOUTH AUSTRALIA
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REVIEW OF RESEARCH CENTRES

REPORT TO THE RESEARCH POLICY

ADVISORY COMMITTEE

SOUTH AUSTRALIAN DEPARTMENT OF AGRICULTURE

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DEPARTMENT OF AGRICULTURE

REVIEW OF RESEARCH CENTRES

INDEX

INDEX 2

1. SUMMARY AND RECOMMENDATIONS

1.1 A Working Party was established by the Research Policy Advisory Committee (RPAC) of the S.A. Department of Agriculture (SAGRIC) to examine the present use of research centres by SAGRIC, investigate alternate methods of conducting the research presently based on research centres and develop a plan for the future that would best serve S.A. agriculture in the next 20 years. The Working Party was also requested to advise on the future use that could be made of two bequeathed estates, at Saddleworth and Cleve, S.A.

THE NEED FOR, EFFECTIVENESS OF AND EFFICIENCY OF RESEARCH CENTRES

1.2 The Working Party first examined the potential needs for research centres in SAGRIC.

Recommendation 1 Research centres in SAGRIC should provide the following:

- *A group of specialist research officers ideally 5 or more in each*
- *Land for experiments which require intensive management or security*
- *Land for experiments, some of whose treatments may be potentially damaging to the agricultural resource*
- *Land for providing specialist services on a cost-recovery basis to particular industries e.g. seed multiplication, poultry random sample laying test*
- *Land for establishing demonstrations of agricultural innovations or new farming systems, both for the S.A. farming community and the international dryland agricultural community.*

1.3 An examination of the effectiveness and efficiency of operation and production of the research centres indicated that a number of structural changes to the network and resources of research centres were required to improve research operations in SAGRIC. These specific suggestions have been further developed in the Report when the future organisation of the centres in SAGRIC is considered. However the Working Party was concerned at the efficiency and effectiveness of a number of SAGRIC research centres.

Recommendation 2 The research centre management should be encouraged to operate on a more commercial basis to improve the income from the property but without prejudicing research requirements.

USE OF LEASED LAND OR ON-FARM RESEARCH

1.4 The Working Party examined both the financial aspects and the scientific merit of using research centres, leased land or private farm arrangements as places to conduct research. It was found that well sited research centres were the most economical means for conducting research but that lease or private farm arrangements added flexibility and acceptability by farmers of research programmes, and should be encouraged. However, the lease arrangements were difficult to arrange administratively and were expensive for SAGRIC under current State Government funding practices compared with conducting research on well located research centres. There were also difficulties noted in conducting on-farm experiments that may have an element of risk or involve some loss of production.

Recommendation 3

Research Centres should be retained as sites of scientific investigation but should be located so that they represent the farming conditions of the agricultural/horticultural industries and regions being served. They should be consolidated to make more efficient use of manpower. More flexibility in the management of centres should be introduced so that resources can be made available for off-centre research work.

Recommendation 4

- *That the Department draft a sample lease agreement which specifies the basis for rent negotiation, term of the lease, frequency of rent re-negotiation, responsibility for capital improvements and a method of sharing capital improvements at the end of the lease.*

- *That funding arrangements such as a deposit account, appropriate to the needs of leased property, be investigated.*

Recommendation 5 An indemnity contract should be used where high risk experiments are conducted on private properties to guarantee the landholder against loss.

1.5 The Working Party reviewed the use of research centres as extension and demonstration sites and found that there was inadequate information available that could help the Working Party reach a conclusion.

Recommendation 6 That SAGRIC conduct a study to review the relative value of research centres and private properties as sites for extending research results.

BEQUEATHED ESTATES

1.6 Winkler Estate, Saddleworth and Sims Farm, Cleve were examined for their potential use as research centres in SAGRIC. It would take considerable capital and operating expenses to upgrade these estates into either operational research centres or outstations of current research centres. Winkler Estate is on a soil type similar to that of Turretfield Research Centre and Mortlock Experimental Station of Waite Agricultural Research Institute. Sims Farm has a soil type which is found in only a small portion of Eyre Region whereas the need of the Region is to conduct research on the more predominant dune swale country.

Recommendation 7 That Winkler Estate be sold and the funds invested in a research facility sited at an appropriate location and incorporating the name of G.G. Winkler.

Recommendation 8 The land of G. Sims' Farm that is under SAGRIC control should be sold and the proceeds used to purchase land for research in the dune swale country.

FUTURE NEED FOR, OPERATION AND LOCATION OF RESEARCH CENTRES

1.7 The Working Party set about the task of designing a research centre plan for the next 20 years by considering what resources were required to serve

both the agricultural and horticultural industries and the specific requirements of each Region. The existing research resources were then fitted into the plan taking account of location and balance and aggregation of staffing between centres. The plan also caters for the current and projected future needs of the rural sector of South Australia. The Working Party examined all research centres but only provided recommendations where changes were considered to be required.

1.8 Of the Horticultural Research Centres, it was established that the service provided to industry from Lenswood Research Centre could be more effectively and efficiently achieved if the centre were sold,a district office established to provide an extension resource to growers and the existing research integrated with that of the groups of research officers established at Nurioopta and Northfield. In the Riverland there was a need established for more land suited to citrus and other potential crops. The need for a Vegetable Research Institute was examined but it was agreed that it would be more efficient to continue to attach research officers working in vegetable research to existing research centres. However, it was recommended that some procedures for co-ordinated vegetable research across the State needed to be developed.

Recommendation 9 Horticultural Research (1) That Loxton Research Centre be provided with a new site for citrus and other potential crops for the Riverland.

(2) That Lenswood Research Centre be sold, a district office established at Mount Barker to accommodate advisory staff and that the research officers and facilities at Lenswood be re-located to the Nuriootpa Research and Advisory Centre and the Northfield Research Laboratories.

1.9 In the cereal/sheep zone of the northern Adelaide Plains and Yorke Peninsula, Mortlock Experimental Station and Turretfield Research Centre represent similar environments and soil types. It was evident that a research centre on the alkaline mallee soils would have a greater research relevance and community acceptance than the present site at Turretfield.

Recommendation 10 - Cereal/Sheep Zone - northern Adelaide Plains and Yorke Pensinsula

(1) That the Turretfield Research Centre be sold and the activities transferred to a new site in the alkaline mallee soil.

(2) That negotiations be undertaken with the Waite Agricultural Research Institute for SAGRIC for access to land on the slightly acid red brown earth area on Mortlock Experimental Station.

1.10 The Working Party noted that there were three research centres located in the high rainfall-grazing zone of S.A. Struan, Kybybolite and Parndana. Much of the work was not site specific and could be conducted on any of the three centres given the right facilities. The number of research officers on these centres was below 5, a figure below which it is considered that research productivity of a group falls. Consequently there was a need to combine these centres for more efficient use of the research resources available. It was also noted that dairy farming had in recent years contracted to the high rainfall-grazing zone and that the dairy farming research of Northfield Research Centre would have more relevance if it were conducted in the same zone.

Recommendation 11 - High Rainfall Grazing Zone - That the Kybybolite Research Centre be sold and the activities transferred to Struan Research Centre; that the proceeds from the sale be used to purchase land adjacent to Struan and to improve the Struan facilities.

Recommendation 12 That the dairy research and the high rainfall regional research for the Adelaide Hills and Kangaroo Island be relocated to a new site in the southern Adelaide Hills. This would involve the sale of the paddocks south of Folland Avenue and east of the security complex at Northfield Research Centre and the sale of Parndana Research Centre.

1.11 In the cereal/sheep zone of the Murray Mallee, low-cost research/demonstration work is conducted of the Wanbi Research Centre. The Working Party accepted the need for such an operation but considered that its effectiveness could be improved by appointing a manager.

Recommendation 13 Cereal/Sheep Zone-Murray Mallee: That a manager be appointed to Wanbi Research Centre.

1.12 The cereal/sheep zone of Eyre Region is serviced by a research centre at Minnipa conducting research work directed by Adelaide based research officers and also providing a service role for Eyre Region by producing basic seed grain. The soil type of Minnipa Research Centre only represents a small portion of Eyre Region. This produces a problem in transferring the findings of research work to the more predominant dune swale country. The Working Party has proposed two options for Eyre Region in establishing a research resource on the dune-swale country.

Recommendation 14 Cereal/sheep Zone - Eyre Region The Working Party proposes that two options be considered:-

Option 1. Sell the balance of Sims Farm and invest the proceeds in an outstation of Minnipa Research Centre called the Gordon Sims Research Farm, located south of Minnipa.

Option 2. Sell the balance of Sims Farm and the Minnipa Research Centre and establish a new research centre in the dune-swale country with a portion called the Gordon Sims Research Farm.

The second option is favoured by the Working Party for reasons mainly related to the problems associated with the management of the two land areas in option 1.

1.13 A number of options regarding staffing of Minnipa Research Centre or its replacement were considered. It was decided to recommend that research officers from other sources be used to provide a consulting research role and more technical staff employed to handle the daily management of the projects.

Recommendation 15 That the staffing of Minnipa Research Centre (or its replacement) be provided by means of adequate technical officer support for projects implemented by research officers located at Port Lincoln and other Regions/Division.

1.14 In the Northern Pastoral Zone of the State there is no justification for providing a research centre, which would require a large area of land, although it was considered that a research group was required in this zone.

Recommendation 16 Pastoral Zone - That a research group be established at the Northern Regional Headquarters and that it operate as a mobile unit on the research problems of the pastoral zone.

OTHER ISSUES

1.15 In the course of developing the Report, a number of issues were raised. The first involves the establishment of a research centre trading account. Many research centres were finding that the operating funds provided by the government were being eroded by cost increases in items such as fertilizers, fencing, roads, electricity and machinery maintenance. The Working Party examined the option of establishing a Research Centre Trading Account but was concerned that this may cause the research centres to change their emphasis towards operating for a profit rather than conducting good research. There are, however, many opportunities where commercial practices could be implemented to make small profits on research centres, given the funds to invest in the venture.

Recommendation 17 That a trading account for discrete and profitable projects on research centres be investigated with the aim of making centres more commercially orientated but without prejudicing research requirements.

1.16 The Working Party considered the current titling of research centres and the management of lease properties and made the following recommendations.

Recommendation 18 That Research Centres be titled according to the nearest recognised town.

Recommendation 19 That all lease properties be under the control of the manager of the nearest SAGRIC research centre.

REVIEW OF RESEARCH CENTRES

Report to the Research Policy
Advisory Committee

2. INTRODUCTION

THE REVIEW OF RESEARCH CENTRES

2.1 The South Australian Department of Agriculture (SAGRIC) has been operating research centres for many years, some dating back to the turn of the century. Of the total expenditure of $6.46 m on research in the Department in 1980/81, approximately 20 per cent was spent on providing the staff, facilities and operating funds required to run research centres, apart from the expenditure related to specific research projects. In addition to the research centres at Minnipa, Nuriootpa, Loxton, Wanbi, Struan, Kybybolite, Lenswood, Northfield, Parafield, Turretfield and Parndana, land is held for research purposes from bequests at Cleve and Saddleworth. The location of each centre is given in Figure 1.

2.2 The Research Policy Advisory Committee has a role of "Advising the Director-General of Agriculture on changes identified as necessary to the Department's research activities, particularly with respect to expansion, modification, redirection or termination of existing research, initiation of new research and priorities for change". The committee identified a need to formulate a constructive plan for the future research centre requirements of the Department and a Working Party was appointed with the following terms of reference:

- Review the need for, effectiveness of and efficiency of operation of research centres currently run by the Department of Agriculture.

- Advise on the cost-effectiveness and scientific merit of using research centres compared with other sites for the conduct of scientific investigation.

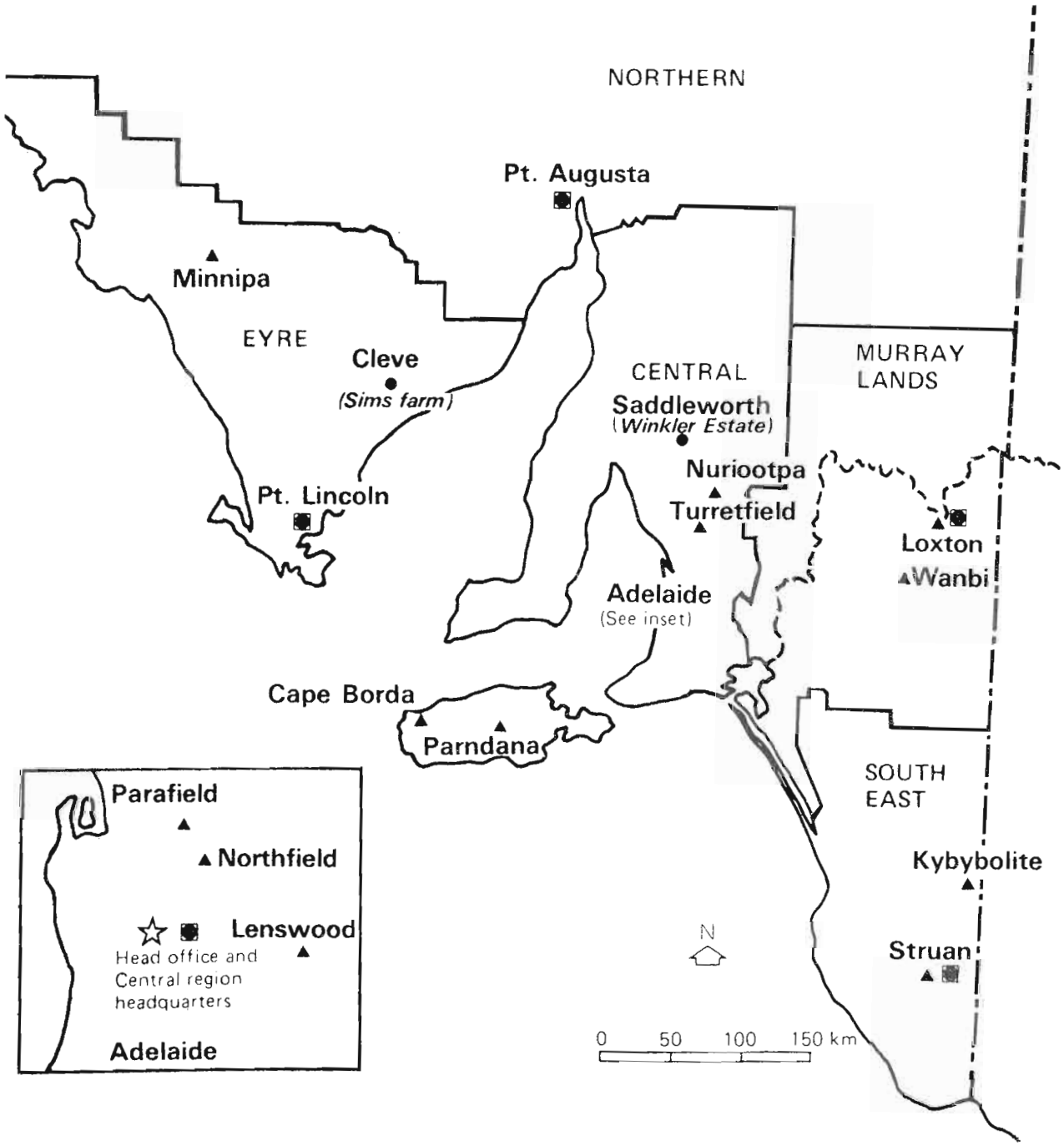
- Examine the potential value for research or other purposes of land bequeathed to the Department of Agriculture at Cleve and Saddleworth.

- In the context of projections for the future of South Australian agriculture, recommend on the future need for, operation of and location of research centres to service South Australian agriculture in the next 20 years.

2.3 The Working Party comprised Mr. J.C. McColl, Director General of Agriculture, (Convenor); Mr. H.P.C. Trumble, Deputy Director General of Agriculture; Dr. P.T. Bailey, Senior Research Officer; Mr. A.R. Forrest, Acting Principal Rural Assistance Officer; Mr. H.P.K. Dunn, Farmer, Rudall S.A.; Mr. A.V. Cook, Agricultural Economist and Mr. R.B. Wickes, Principal Officer, Research Management (Executive Officer).

Figure 1: Department of Agriculture—Location of Research Centres and Bequeathed Estates

☆ HeadOffice
■ Regional Headquarters
▲ Research Centres
● Bequeathed Estates



3. METHOD OF EVALUATION

INTERPRETATION OF TERMS OF REFERENCE

3.1 The Working Party in interpreting the terms of reference felt there was a need to define more precisely the area of research activity under review. It was agreed that "A research centre for the purposes of this review is a facility where land, under the control of the Department of Agriculture, is the primary resource on which research is conducted". Thus the review did not consider areas where the major research capacity is laboratory based such as at Northfield Research Laboratories, Grenfell Centre and the laboratory activities of the Loxton Research Centre.

DEVELOPING THE RECOMMENDATIONS

3.2 The recommendations have been based on information gathered from:

- the financial expenditure and descriptive information requested (Appendix I) from the Regions/Divisions administering the centres.
- the written submissions received from thirty Departmental Officers (Appendix II) who submitted a range of constructive ideas.
- the written submissions received from twentythree major rural industry groups (Appendix II) who provided excellent comment on most research centres.
- other major research organisations, both in South Australia and interstate (Appendix II), which have reviewed their research centre structures recently.
- the SAGRIC Corporate Plan.
- the summaries of the discussions between the members of the Working Party and staff during the research centres inspections.
- the submission from SAGRIC to the Balderstone Committee developing a policy discussion paper on agriculture (Anon 1982a).
- recent research management reports (Radcliffe, 1976, Walker *et al.* 1977).

3.3 The Working Party was constrained in developing recommendations by:

- the total realisable capital that could be available from property sales, in any restructuring of the centres
- the number of research staff and operating funds available to effectively operate research centres

3.4 Given the information provided and the constraints imposed upon the Working Party, a series of recommendations has been developed for the operation and location of research centres and aimed at providing the best service for S.A. agriculture in the next 20 years.

REFERENCES

Anon (1982a) - Agriculture in South Australia - A submission to the working group preparing a policy discussion paper on agriculture. *S.A. Dept. Agric. Tech. Report No 1.*

Radcliffe, J.C. (1976). A report on research management within the Department of Agriculture and Fisheries, South Australia *S.A. Dept. Agric.* 69 pp Mimeo.

Walker, A.J.K. Hawkings, H.S., Martin, A.E., Lindner, R.K., Hunt, C.A.G., Radcliffe, J.C., Lohmeyer, V.K. and French, R.J. (1977). Report on the Research Management Committee. *S.A. Dept. Agric. and Fish.* 51 pp Mimeo.

4. NEED FOR, EFFECTIVENESS AND EFFICIENCY OF RESEARCH CENTRES

NEED FOR RESEARCH CENTRES

4.1 It is estimated that there is a total realisable capital investment of $19m in research centres in SAGRIC and that 20% of the total annual expenditure in research is spent on maintaining these centres. A summary of the land area, the original use intended for the land when acquired and the current activities of each centre are given in Table 1. The Working Party was not surprised to find that there was strong support for retaining all the Centres both from officers within the Department and from Rural Industry groups. It was noted that a number of criticisms were made of the effectiveness and efficiency of some centres in the submissions received. In the view of the Working Party, the need for each research centre was not always convincingly established.

4.2 Research in the Department as described in the Departmental Charter is to "Conduct research into the biological, physical, social and economic aspects of existing and potential agricultural industries and improve the quality and efficiency of production and marketing". Consequently research in SAGRIC is mainly of an applied nature and is conducted either in the laboratory, in "controlled conditions" such as growth cabinets, glasshouses, animal houses; in simulated field conditions such as glass houses, animal houses, and small field plots; or in full scale farm conditions. Research is catered for by private property, lease property or SAGRIC owned land. Applied agricultural research is typically a progression from experiments with carefully controlled environmental conditions to successively larger experiments which ultimately incorporate the complex environmental conditions encountered in commercial agriculture. The sites at which these experiments are conducted thus represent a sequence of stages in the application of research results. Depending on the type of research, experiments on research centres lie somewhere in the middle of the sequence between small scale experimentation and application under commercial conditions. Experiments on leased land or on private properities, without formal leases, may be used to establish the general application of research centre results.

4.3 Agricultural research centres are operated in Australia mainly by C.S.I.R.O., Universities, Private Industry and State Departments of Agriculture. Although C.S.I.R.O. has a field station at O'Halloran Hill in South Australia, there is currently no research work being conducted that is relevant to S.A. agriculture. While interstate field stations of C.S.I.R.O. do conduct research of relevance to South Australia, these stations do not generally produce research which can be directly applied to South Australian agriculture. The Waite Agricultural Research Institute and Roseworthy Agricultural College operate field stations but, with the exception of one research centre identified later in this report, do not overlap functionally or geographically with SAGRIC research centres. Field stations operated by private industry, in particular the chemical industry at interstate sites, conduct research on specific problems (mainly pesticides) and this function is generally not duplicated by SAGRIC research centres. The Working Party thus accepts that there is a need for SAGRIC to continue to use research centres as an integral part of the application of research results to South Australian agriculture, and that SAGRIC is the only institution in South Australia with the necessary charter and funding to operate a network of research centres for applied agricultural research.

TABLE 1

A SUMMARY OF THE ACTIVITIES OF THE RESEARCH CENTRES IN SAGRIC AND THEIR RELATIONSHIP TO OTHER SAGRIC AND INTERSTATE RESEARCH CENTRES

RESEARCH CENTRE	AREA (ha)	DATE ACQUIRED	INTENDED USE	AGRICULTURAL INDUSTRIES	ENVIRONMENT TO WHICH THE CENTRE RELATES	FIELD OF EXPERTISE	OVERLAP WITH OTHER SAGRIC CENTRE	INTERSTATE EQUIVALENT CENTRES	OTHER ROLES OF CENTRE
ANIMAL INDUSTRY DIVISION									
Northfield Dairy	245	1962	Dairy Research	Dairy cattle	Mid North Dairying Area	Nutrition, Husbandry, Health, Fodder Conservation	With Turretfield environment	Ellinbank, Vic, Kyabram Vic	Fodder analysis services, Plots for other Divisions
ANIMAL HEALTH DIVISION									
Northfield Pig	6	1970	Pig Research	Pigs	Not environmentally dependent	Nutrition, Husbandry, Health, Reproduction, Physiology	Nil	All States	Nil
PLANT INDUSTRY DIVISION									
Northfield Horticulture	5	1968	Virus screening, Fruit storage	Vines, Citrus Stone/ pomefruit	Not environmentally dependent	Virus screening Long term fruit storage	Nil	-	Nil
ANIMAL INDUSTRY DIVISION									
Parafield Poultry	15	1906	Poultry Research	Poultry Meat & Eggs	Not environmentally dependent	Genetics, Egg quality, Husbandry of layers	Nil	All States (14 centres)	Random sample laying test, Genetic conservation, Fertile eggs

TABLE 1 (Contd)

RESEARCH CENTRE	AREA (ha)	DATE ACQUIRED	INTENDED USE	AGRICULTURAL INDUSTRIES	ENVIRONMENT TO WHICH THE CENTRE RELATES	FIELD OF EXPERTISE	OVERLAP WITH OTHER SAGRIC CENTRE	INTERSTATE EQUIVALENT CENTRES	OTHER ROLES OF CENTRE
PLANT INDUSTRY DIVISION									
Parafield Plant	23	1906	Cereal & grazing plots	Introduction new herbage plants	Soil & Environ. suited for most pasture plants	Genetic & Agronomic	Nil	All States & CSIRO	Nil
ANIMAL INDUSTRY DIVISION									
Cape Borda	350	1978	Sheep research	Wool & Sheep meat	High rainfall & oestrogenic pastures	Genetics, sheep	Parndana	Nil	Nil
CENTRAL REGION Turretfield	650	1908	Dairy Farm	Wool, Sheep, Meat, Beef, Cereals, Legumes, Oilseeds, Pastures, Goats	Redbrown earth with Mediterranean climate	Beef, sheep and goat husbandry and agronomy	Nil (Mortlock Experimental Station)	Centres in NSW, Vic. and WA.	Maintenance plots for Northfield Laboratories
Parndana	497 (401 arable)	1950	Information for War Service Land Settlement Scheme	Wool, Beef, Crops	High rainfall lateritic ironstone soils	Oestrogenic pasture management, Beef internal parasites	Kybybolite and Struan	WA, Vic & NSW	Seed certification, Cape Borda assistance

TABLE 1 (Contd)

RESEARCH CENTRE	AREA (ha)	DATE ACQUIRED	INTENDED USE	AGRICULTURAL INDUSTRIES	ENVIRONMENT TO WHICH THE CENTRE RELATES	FIELD OF EXPERTISE	OVERLAP WITH OTHER SAGRIC CENTRE	INTERSTATE EQUIVALENT CENTRES	OTHER ROLES OF CENTRE
CENTRAL REGION									
Lenswood	70 (39 arable)	1964	Apple, pear & cherry research	Orchards, vegetables berry fruits, ornamentals, hobby farms	High rainfall Adelaide Hills	Orchards and Vegetable crops	Nil	Vic, NSW, TAS, WA	Rootstock production Grazing & apples for fruit storage work
Nuriootpa	32	1939	Vine Research	Viticulture	Cool area viticulture (Barossa - South East)	Viticulture Pathology	Nil	Nil	Rootstocks collections
Winkler Estate	229	1975	Research farm	Cereal/ Sheep	Red brown earth, Mediterranean climate	Sub-clover plots	Turretfield	Nil	Nil
MURRAY LANDS									
Loxton	100	1962	Horticultural research (Replaced Berri Exp. Orchard)	Viticulture, citrus, stonefruits, potato, wheat, vegetable	Dryland irrigation	Crop protection, Plant pathology Irrigation and Salinity management	Nil	Irymple Vic Dareton, NSW CSIRO Griffith, NSW CSIRO Merbein, Vic.	Resource for off centre research
Wanbi	1424 (1350 arable)	1952	Soil conservation reserve	Wool, beef, cereals	Sandy mallee soils in area 60% drought frequency	Dryland farming, Cattle husbandry	Nil	Walpeup, Vic.	

TABLE 1 (Contd)

RESEARCH CENTRE	AREA (ha)	DATE ACQUIRED	INTENDED USE	AGRICULTURAL INDUSTRIES	ENVIRONMENT TO WHICH THE CENTRE RELATES	FIELD OF EXPERTISE	OVERLAP WITH OTHER SAGRIC CENTRE	INTERSTATE EQUIVALENT CENTRES	OTHER ROLES OF CENTRE
SOUTH EAST									
Struan & Wandilo	1093 272	1947 Leased since 1975	Cattle research	Beef, sheep, crops	High rainfall (600mm) Rendzina, sandy and podsolic soils	Breeding and husbandry of beef cattle	Parndana, Turretfield	Hamilton, Vic	Resource for off-centre research
Kybybolite	301	1905	Development of an agriculture for Kybybolite Station Subdivision	Sheep, pastures	high rainfall (550 mm) solodize solonetz	Reproduction & husbandry of high rainfall sheep	Parndana	Hamilton, Vic.	Resource for off centre research
EYRE REGION									
Minnipa	1202	1909	Seed Production	Cereal, grain legumes, sheep pasture	Sandy loam over limestone, 30 mm rainfall	Cereals, farm mechanisation, plant protection, sheep genetics	Wanbi, Turretfield	Centres in WA, NSW, Vic.	Basic seed production, Off centre research
Sims Farm (bequeathed estate)	402	1960	Research farm	Cereal/ livestock	sandy loam over reddish clay	Water harvesting	Nil	Nil	Nil

4.4 As a general principle the Working Party believed that there was a need to maintain research centres with broad farming areas easily accessible by research staff so that they can tackle applied farm problems and develop and maintain their practical skills of farming. Without this facility the Working Party felt that research officers would find it difficult in having to base their total work programmes on farmer managed properties, particularly in the animal science area. The research of SAGRIC could then become more fundamental in nature and laboratory, animal house or glass house orientated.

4.5 The Working Party recognised a need for centres of research in the Regions/ Divisions of SAGRIC. At each centre a group of research and resource specialists and their technical support was based. A study in NSW (Dun, 1966) indicated that the research work of a centre became less effective if the number of research officers in an isolated group fell below 5. Reasons that may lead to this are the increased administrative load on each individual, the reduced opportunities for interaction with peers and reduced access to or availability of support resources (e.g. library, laboratory facilities and assistance). Where there are a number of industries being served from the one centre the ideal number of officers may need to approach ten. The Working Party adopted the concept of having a centre of research for the Regions and/or rural industries. It was considered that each research officer should have the services of two technical staff to make effective use of research officer time. Table 2 shows that on many centres neither the desired number of research officers nor technical support staff currently exist.

4.6 At each centre of research activity it is necessary to establish the need for facilities and land. It was evident that experiments close at hand and viewed daily were in most cases better managed than those located at some distance (i.e. out of sight - out of mind). The area of land required depends upon the type of agricultural industry being researched. The Working Party is of the opinion that on all research centres staffed by research specialists there is a need for land, in close proximity to the laboratory, where experimental work requiring daily measurement, surveillance or security can be conducted. There is also a need for land where demonstrations can be established where visiting farmers and international visitors can be shown a range of innovations such as dryland farming systems, hay handling equipment, animal feeding methods, irrigation techniques, new trellising methods etc.

4.7 The Working Party found that site specific research work such as soil nutrient studies, testing of new varieties of plants and irrigation techniques was being conducted on private farms under informal arrangements. There is a need for SAGRIC land to be available at research centres so that staff can conduct innovative experiments or experiments in which some treatments may severely reduce production and bring an adverse reaction. It was also evident that research centres involved in conducting complex animal feeding or animal breeding studies required adequate SAGRIC controlled land and facilities so that the research staff had full control and security of their projects. Many of the animal field studies conducted on research centres require considerably more handling of animals than found on commercial farms. There are often many small groups of sheep or cattle requiring a high investment in fencing and holding facilities and the experiments are often scheduled to run for at least four years.

TABLE 2

NUMBER OF STAFF ON EACH CENTRE (June 1981)

CENTRE	STAFF							
	RESEARCH OFFICERS			TECHNICAL STAFF		FARM ADMIN	FARM ASSIST	CASUAL (PERM)
	WORKING BASED ON	OFF ON	ON OFF	ON ON	OFF ON			
DIVISIONS								
Northfield Dairy	4	-	-	4	-	3	11	-
Northfield Pig	-	-	5	1	-	1	3	-
Northfield Hort.	2	-	-	2	-	-	2	-
Parafield Poultry	3	-	0.5	2	-	2	9	2
Parafield Plant	-	-	0.1	2	-	-	3	-
Cape Borda	-	-	3.0	-	-	1	-	-
CENTRAL REGION								
Turretfield	7	-	2.0	6	-	3	7	2
Parndana	1	-	1.2	3	-	2	4	-
Lenswood	2.2	-	-	1	-	2	8	-
Nuriootpa	1	-	1	1	-	2	4	6
Winkler Estate	-	-	-	-	-	-	-	-
MURRAYLANDS								
Loxton	6.2	5.8	1	7	7	2	9	-
Wanbi	-	-	0.5	0.5	-	1	2	-
SOUTH EAST								
Struan (Wandilo)	2.4	2.7	2.0	4	-	2	8	2
Kybybolite	2.3	1	2.0	6	-	2	3	2
EYRE								
Minnipa	0.7	0.3	2.1	3	-	2	3	-
Sims Farm	-	-	0.1	-	-	-	-	-
TOTALS	31.8	25.8	21.5	42.5	7	25	76	14

4.8 Research centres need to provide a specialist service to the agricultural industries. The Parafield Poultry Research Centre conducts a Random Sample Laying Test for industry on a complete cost recovery system. Turretfield Research Centre and Minnipa Research Centre provide a specialist service in multiplying field crop breeders' seed through to basic seed. This is a labour intensive operation and requires the avoidance of seed contamination and appropriate management to ensure the seed harvested is pure. It is a legitimate specialist service to the industry provided there is complete cost recovery. Pure genetic stocks of resource material for plant improvement programmes must be maintained. The multiplication of material for release to industry is conducted on grower properties. The maintenance of the basic genetic resource, however, should be well managed and secure and should be conducted on SAGRIC-controlled land.

4.9 It was often proposed to the Working Party that the role of some research centres was to provide grain to the more livestock-intensive research centres based near Adelaide. However, there is no justification for maintaining a research centre as a grain producing source *per se* but this cost must be discounted against a need for maintaining the land area for research.

4.10 The Working Party considers that for SAGRIC to fulfil its charter there is a need for SAGRIC to own and operate research centres which provide a range of facilities.

Recommendation 1 Research centres in SAGRIC should provide the following:

- *A group of specialist research officers, ideally 5 or more in each*
- *Land for experiments which require intensive management or security*
- *Land for experiments, some of whose treatments may be potentially damaging to the agricultural resource*
- *Land for providing specialist services on a cost-recovery basis to particular industries e.g. seed multiplication, poultry random sample laying test*
- *Land for establishing demonstrations of agricultural innovations or new farming systems, both for the S.A. farming community and the international dryland agricultural community.*

EFFECTIVENESS OF RESEARCH CENTRES

4.11 The assessment of the effectiveness of research centres in the past is a difficult one. The Working Party, in examining the corporate objectives and functions of SAGRIC (Anon. 1982), agreed that since SAGRIC was conducting applied research, the criteria for assessing the effectiveness of research centres should relate to the amount of new technology developed and the rate of adoption of that technology by the farming community. To assess this the Working Party collected information on the technology developed on research centres for the farming community, the technology adopted by the farming community and the amount of exposure to the research given to the farming community and to other scientific groups. Table 3 provides the data on the amount of exposure given by staff on research centres to the rural community and the scientific community. The data on the number of

technological innovations adopted by the farming community has not been presented as it was very variable and difficult to interpret.

4.12 It is apparent from Table 3 and from comments received from the rural industries that there is a diversity in the amount and method of communication of research results from the centres. This is caused by a combination of factors including the management of the research on the centre, the number and motivation of the research officers employed, the number of technical support staff on each centre in relation to research staff numbers, the relevance of the work on the centre to the rural industries they are servicing and the suitability of the centre as a site to tackle problems in the industry. The Working Party recognises that although certain research centres may well have contributed substantially in the past, this should not influence consideration of the need for and location of research centres in the future.

Horticultural Research

4.13 The effectiveness of research in the horticultural research centres, Loxton Nuriootpa and Lenswood varies markedly when comparing them by the criteria shown in Table 3. Loxton and Nuriootpa Research Centres appear to be providing an effective focus of research activities in the River Murray irrigation area and the temperate viticultural areas of S.A. respectively. Loxton has a high interaction with growers which may relate to the concentration of technical knowledge at the one centre. In addition the effective use of research officer time at Loxton and Nuriootpa could be improved by providing extra technical staff to help them conduct a wider range of experiments (Table 2).

4.14 The Lenswood Research Centre does not appear to be providing an effective focus for research in the Adelaide Hills and some industry groups identified laboratory based staff at Northfield as their source of information. This may in part be due to the low numbers of research staff on Lenswood Research Centre. The Northfield Horticultural Unit appears to have an effective service role to horticultural growers in providing resource material, virus indexing and quarantine facilities. The provision of a post-harvest research facility at Northfield by the Plant Industry Division is seen as an effective method of providing non-site specific research work to a range of the horticultural industries across S.A.

Cereal-Sheep Zone

4.15 The research centres in the cereal sheep zone are Turretfield, Minnipa and Wanbi serving the mid North, Eyre Peninsula and Murray Mallee areas of S.A. respectively. The effectiveness of their research communication appears to have been low over the last five years. Both Minnipa and Turretfield have annual field days which are well attended. Minnipa and Wanbi have not had resident research officers and consequently the research activities have primarily been aimed at maintaining some research programmes complemented by demonstration areas. Minnipa has, since its inception, produced basic seed grain primarily for certified seed growers on Eyre Peninsula.

TABLE 3

THE NUMBER OF VISITORS, REQUESTS FOR INFORMATION FROM STAFF AND PUBLICATIONS: SAGRIC RESEARCH CENTRES (1980/81)

RESEARCH CENTRE	NUMBER OF VISITORS			OUTSIDE EXTENSION ADDRESSES			PUBLICATIONS IN PAST 5 YEARS			
	GROUPS	EDUCATION GROUPS	INDIVIDUALS	BUREAUS	CONFERENCES	FIELD	SCIENTIFIC	SHORT PAPERS	BULLETINS	FACT SHEETS
DIVISIONS										
Northfield Dairy	5	20	25	6	8	0	24	8	5	1
Northfield Pig	2	13	72	0	18	0	14	2	8	7
Northfield Horticulture	15	3	30	1	10	9	0	12	6	40
Parafield Poultry	2	14	170 (Fair 800)*	0	1	0	10	2	3	7
Parafield Plant	0	2	77	2	4†	0	5	4	0	0
Cape Borda	0	0	8	2	0	0	0	2	0	0
CENTRAL REGION										
Turretfield	5	9	10	5	18	0	19	3	28	1
Parndana	3	4	30	3	0	0	19	0	3	3
Lenswood	4	3	12		50% Research Staff time		0	0	0	7
Nuriootpa	11	12	250	2	4	2	3	0	0	11
MURRAYLANDS										
Loxton	63	10	700	20	10	15	0**	9	4	26
Wanbi	5	7	(300)++	0	0	0	3	3	3	1
SOUTH EAST										
Struan	6	0	500	12	6	42	17	8	11	13
Kybybolite	6	0	200	12	9	11	10	3	-	1
EYRE REGION										
Minnipa	4	5	295	0	0	0	4	4	0	0
Sims Farm	5	0	0	0	0	0	0	0	1	1

* Poultry Fair held annually at Parafield

** There are scientific papers published from Loxton Research Centre but none from the work conducted on research centre land.

† Includes the delegates to the International Dryland Farming Conference.

++ Average of field days over 3 years

4.16 Turretfield Research Centre staff, although having a good publication record as shown in Table 3, appear not to have been effective in communicating with producers. The centre does not appear to have provided a research resource for the Northern Adelaide Plains and Yorke Peninsula cereal/sheep zone. It is located on the high rainfall edge of this zone and is not readily accessible by farmers. Much of the work conducted on the centre has involved non-site specific animal husbandry and nutrition. Much of the site-specific work has been conducted from Northfield Research Laboratories and many of the farmers in this region relate to the Northfield research officers rather than to those at the Turretfield Research Centre.

High Rainfall-Grazing Zone

4.17 The research centres of Struan, Parndana and Kybybolite are all conducting research in the high rainfall zone. It can be seen from Table 3 that all centres have published many papers and the staff have provided contact with farmers through formal meetings and talks. Parndana and Kybybolite Research Centres were established to provide answers to site-specific problems when Kangaroo Island and Kybybolite Station respectively were subdivided for agricultural development. Much of the work in developing site-specific agricultural technology has been completed and they are now predominately used for non-site-specific research work. The three centres in this zone have less than the minimum desired number of 5 or more research officers (Table 2), although the officers at Struan Research Centre do have the opportunity to interact daily with those at the South East Regional Headquarters. Much of the work could just as effectively be conducted on any of the centres, given the right facilities. The Working Party questions the effectiveness of having three centres that have inadequate staff and are working on high rainfall zone non-site-specific research problems.

Dairy, Pig and Poultry Centres

4.18 The Northfield Dairy Research Centre, although having a very good publication record, appears to have a low contact with the Dairy Industry through visits and formal addresses. The dairy industry has in recent years contracted to the high rainfall and irrigated areas of South Australia. This has reduced the relevance of the work at Northfield since it has to be translated from the drier Northfield environment to the current dairying areas. This may contribute to the low number of visits by farmer groups to the centre.

4.19 The Northfield Pig Research Unit is providing effective research for S.A. pig producers. This is achieved by having a very close relationship with the local industry, including industry funding, and an active pig research staff of 5. Pig research is not site-specific and can be transfered from interstate. Standing Committee on Agriculture recently considered the rationalization of pig research and identified S.A. as having the responsibility for herd health and management research.

4.20 The Parafield Poultry Research Centre was recently reviewed by a working party of RPAC in 1979 and a number of recommendations have been implemented to make it more effective and relevant to the poultry industry. A research committee has been established with industry representatives to provide research priorities for the centre. A number of non-research activities

have been discontinued, the random sample laying test and the pure breeds programme are now financially supported by the industry, weekly paid staff numbers reduced and the replacement of laboratory facilites reviewed.

4.21 The Parafield Plant Introduction Centre has provided Medicago genetic material to SAGRIC and interstate pasture improvement programmes. The Working Party considers that if this centre is to maintain its effectiveness the storage facilities need upgrading and the labour component increasing to be able to maintain the viability of the plant lines. The Working Party noted that this requirement had been considered by the Northfield Planning and Development Working Party and has been included in the plans for a new laboratory complex at Northfield.

Summary

4.22 The Working Party formed an initial broad judgement that a number of research centres did not appear to be effective in providing an adequate research resource for the industries/regions they are serving because of various combinations of low staff numbers, location of the centre, low industry involvement or a lack of new site specific problems. The centres that require closer examination are Lenswood, Turretfield, Minnipa, Wanbi, Parndana, Kybybolite and Northfield Dairy Research Centres.

EFFICIENCY OF RESEARCH CENTRES

4.23 Expenditure in SAGRIC is divided into project lines. The expenditure relating to research centres is allocated firstly into the funds required to operate the centre, and secondly into specific lines for each identifiable research project. The funds required to operate a research centre (salaries and operating) are then further divided by the management of each centre into those necessary to run a government owned farm and those for research. For the purposes of the review the expenditure for operating a government owned farm (salaries, wages and operating) will be termed expenditure A; that to support research (salaries, wages and operating) expenditure B; and that for identifiable research projects expenditure C. The capital equipment depreciation (15 per cent) will be termed expenditure D and income on centres income I. The expenditure and income for 1980/81 on research centres for operating a farm (A, D and I) and for conducting research (B & C) are summarised in Tables 4 and 5 respectively. Table 6 provides the capital investment SAGRIC has in each centre. In Table 7 some indices have been developed to compare the efficiency of use of the funds by centres.

4.24 Overall nett expenditure of A + D - I (Table 4) is $87 396 or $223 202 excluding or including capital depreciation respectively. The Research Centres operating at a loss in excess of $40 000, in descending order, are Lenswood (-$107 023), Northfield Dairy (-$54 376), Loxton (-$51 694) and Nurioopta (-$43 378). The Research Centres with a profit of over $10 000 are Parndana ($18 438), Turretfield ($32 900) and Struan ($189 117).

4.25 Three of the research centres operating at a loss of more than $40 000 are the horticultural research centres. The reason for this loss is that on these centres there has been a policy of having a minimum of permanent plantings to allow flexibility of research activity. Retaining this flexibility increases the cost of conducting research compared with broad acre research.

TABLE 4

SHOWING OPERATING COSTS AND RETURNS IF THE RESEARCH CENTRES WERE RUN AS A HOLDING OPERATION OR "FARM" 1980/81

CENTRE	LAND FIXED COSTS	EXPENDITURE		INCOME		NET INCOME EXCL. CAP	CAPITAL DEPN @ 15%	NET INCOME INCL. CAP DEPN
		STAFF	OPERATING	ACTUAL	FOREGONE			
	(A)	(A)	(A)	(I)	(I)	(A-I)	(D)	(A + D - I)
DIVISIONS								
Northfield Dairy	9589	86360	22222	54395	9400	-54376	24405	-78781
Northfield Pig	2363	40498	44771	63448	3050	-21134	5010	-26144
Parafield Poultry	4973	76543	19342	88300	5432	-7126	2810	-9936
Parafield Plant	1685	19080	2034	-	-	-22799	3420	-26219
Cape Borda	10260	12831	20980	38224	-	-5847	1500	-7347
CENTRAL								
Turretfield	6088	36190	26587	90244	11521	+32900	17775	+15125
Parndana	600	31900	15977	66915	-	+18438	10140	+8298
Lenswood	572	88968	28196	9513	1200	-107023	6547	-113570
Nuriootpa	1649	46000	8795	10441	2625	-43378	9187	-52565
Winkler Est.	553	-	-	-	5000	+4447	-	+4447
MURRAYLANDS								
Loxton	7435	58928	11900	25841	728	-51694	5805	-57499
Wanbi	735	25940	13249	44490	200	+4766	5265	-499
SOUTH EAST								
Struan (Wandilo)	1308	17011	35776	243212	-	+189117	16800	+172317
Kybybolite	272	29301	13452	29576	1920	-11529	11415	-22944
EYRE								
Minnipa	3136	49877	44998	39754	44837	-13420	15187	-28607
Sims Farm	590	1000	398	3250	-	+1262	540	+722
TOTAL	51808	620427	308677	807603	85913	-87396	135806	-223202

TABLE 5

THE OPERATING COSTS ON RESEARCH CENTRES DIRECTLY ATTRIBUTED TO RESEARCH 1980/81

CENTRE	FARM SALARIES	FARM OPERATING	RESEARCH		TOTAL RESEARCH	TOTAL RESEARCH CENTRE COSTS		
			STATE	TRUST		SAGRIC	PBD	
	(B)	(B)	(C)	(C)	(B + C)	(A + B + C)	MAINTENANCE	DEBT. SERVICE + SINKING FUND
DIVISIONS								
Northfield Dairy	90673	25190	81185	94561	291609	409780		
Northfield Pig	41632	9023	101193	26766	178614	266246	110334	179401
Northfield Hort.	-	26493	100374	-	126867	126867		
Parafield Poultry	47533	24103	142819	23945	238400	339258	9180	15999
Parafield Plant	52321	7392	-	-	59713	82512	616	13815
Cape Borda	-	15289	11960	14170	41419	85490		
CENTRAL								
Turretfield	93976	25155	180382	25538	325051	393916	17937	16241
Parndana	51800	15268	21000	50678	138746	187223	2814	15574
Lenswood	50663	6599	32718	-	89980	207716	14490	17997
Nuriootpa	84000	15086	30513	10102	139701	196145	9028	60891
Winkler Est.	-	-	-	-	-	553	-	-
MURRAYLANDS								
Loxton	45522	33205	281975	216557	577259	655522	9057	171791
Wanbi	28139	9682	7626	16640	62087	102011	9211	2701
SOUTH EAST								
Struan (Wandilo)	90976	8493	97707	236050	433226	487321	16548	30046
Kybybolite	101840	19480	85771	37732	244823	287848	5090	18705
EYRE								
Minnipa	23858	5503	52530	6071	87962	185973	14383	10852
Sims Farm	-	-	2300	2800	5100	7088		
TOTAL	802933	245961	1230053	761610	3040557	4021469	219318	554013

TABLE 6

ESTIMATED CAPITAL INVESTMENT (1980/81)

CENTRE	EQUIPMENT OVER $500 ($ 000's)	BUILDINGS ($ 000's)	LAND ($ 000's)	TOTAL CAPITAL ($ 000's)
DIVISIONS				
Northfield Dairy	163	1 002	4 290	5 455
Northfield Pig	33	343	300	676
Northfield Hort.	8	1 582	150	1 740
Parafield Poultry	25	1 084	450	1 559
Parafield Plant	23	144	700	-
Cape Borda	10	LEASED	LEASED	867
CENTRAL REGION				
Turretfield	118	485	673	1 276
Parndana	68	156	299	523
Lenswood	44	155	316	515
Barossa	61	524	160	745
Winkler Estate	-	-	130	130
MURRAYLANDS				
Loxton	39	552	172	763
Wanbi	35	51	110	195
SOUTH EAST				
Struan (Wandilo)	112	546	1 404	2 062
Kybybolite	76	348	346	770
EYRE				
Minnipa	101	291	840	1 232
Sims Farm	4	4	220	278
TOTALS	920	7 267	10 560	18 786

TABLE 7

SOME INDICES FOR COMPARING RESEARCH CENTRES - 1980/81

	Research expenditure /total expenditure (%)	Non State Funds /total expenditure (%)	*Research $(000's) /research paper	*Research $(000's) /total publications	*Research $(000's) /extension addresses	*Research $(000's) /research officer	*Research $(000's) /pre-scheduled work	*Total expenditure ($)/arable hectare	Total income ($)/arable hectares	Net farm income ($) /arable hectare	Arable hectare /farm labourer
HORTICULTURAL CENTRES											
Lenswood	43	0	00	64	-	41	15	5 326	275	-2 912	3.9
Nuriootpa	71	5	233	50	17	70	28	6 130	408	-1 643	2.7
Loxton	83	33	00	74	13	80	32	6 555	266	- 575	9.1
Northfield	100	0	00	11	6	63	127	NA	NA	NA	NA
CEREAL/SHEEP CENTRES											
Turretfield	83	6	86	32	14	36	46	606	157	23	54.2
Minnipa	47	3	110	55	-	31	6	155	70	- 24	240.4
Wanbi	61	16	103	31	-	124	31	76	33	- 0.37	450.0
HIGH RAINFALL - GRAZING CENTRES											
Parndana	74	27	37	28	46	63	28	467	167	+ 21	66.8
Struan (& Wandilo)	89	48	127	44	7	98	29	357	178	+ 126	113.8
Kybybolite	85	13	122	87	8	57	16	956	105	- 76	43.0
Cape Borda	48	68	00	104	21	14	14	244	109	- 21	350.0
INDUSTRY SPECIFIC CENTRES											
Northfield Dairy	71	23	61	38	21	73	49	1 673	260	- 322	17.5
Northfield Pigs	67	70	64	29	10	36	20	NA	NA	NA	NA
Parafield Poultry	70	7	119	54	238	68	48	NA	NA	NA	NA
Parafield Plant	72	0	60	33	10	597	20	3 587	NA	NA	7.7

* Research expenditure does not include the minimum cost of operating the "farm"
\- Indicates areas that were not quantified because of a high extension component.
NA = Not Applicable

TABLE 8

THE RESEARCH WORK BEING UNDERTAKEN ON RESEARCH CENTRES AND THE USE BEING MADE OF LIVESTOCK AND LAND AREA

RESEARCH CENTRE	PRESCHEDULED WORK PROCEEDING ON CENTRE		PRESCHEDULED WORK PROCEEDING OFF CENTRE		USE OF LAND			USE OF LIVESTOCK		
	NUMBER	COMPLETION DATE	NUMBER	COMPLETION DATE	% RESEARCH	% SERVICE	% OTHER	% RESEARCH	% SERVICE	% OTHER
DIVISIONS										
Northfield Dairy	6	1985	2	1982	91	-	9	100	-	-
Northfield Pigs	9	1983	-	-	100	-	-	25	-	75
Northfield Hort.	-	-	-	-	-	-	-	-	-	-
Parafield Poultry	5	1982	-	-	-	-	-	22	78	-
Parafield Plant	3	1984	5	1986	35	-	65	-	-	100
Cape Borda	3	1986	1	1988	100	-	-	100	-	-
CENTRAL REGION										
Turretfield	7	1991	3	1984	54	15	31	Sheep 78	-	22
Parndana	5	1984	2	1989	61	-	39	Cattle 100 Sheep 60 Cattle 87	-	- 40
Lenswood	6	-	-	-	28	-	72	-	-	13
Nuriootpa	5	-	3	-	12	25	63	-	-	-
Winkler Estate	1	1982	-	-	-	-	-	-	-	-
MURRAYLANDS										
Loxton	18	1988	24	1993	65	10	25	Geese 100	-	-
Wanbi	2	1983	-	-	58	-	42	Cattle 100 Sheep 0	- -	- Sheep 100
SOUTH EAST										
Struan	15	1990	9	1985	96	2	2	99	-	1
Kybybolite	15	1984	2	1985	98	1	1	99	-	1
EYRE REGION										
Minnipa	14	1986	-	-	54	39	7	93	-	7
Sims Farm	1	1984	4	-	3	-	97	-	-	-
	112		55							

4.26 The loss by the Northfield Dairy Research Centre is related to the high staff costs associated with milking cows 7 days a week and the extra requirements that are associated with maintaining a property in the metropolitan area.

4.27 The other major component of the cost of research centres is the research component (Expenditure B + C) (Table 5). It can be seen that 93% of the funds spent on research centres is attributed to the research conducted on the Centre [(Expenditure B + C) - (Expenditure A + B + C - I)] x 100. Consequently when comparing the efficiency of resource allocation on research centres, the major area to consider is not the maintenance of the land area or "farm" but the efficiency with which the research is being conducted.

4.28 The total nett research expenditure (total research expenditure - income) in 1980/81 in SAGRIC was $5.7 m of which 56% (expenditure A + B + C - I) was used on research centres, the balance being spent on research conducted from central laboratories or offices.

4.29 The Working Party was impressed by the efficiency of some research conducted off research centres and feels that this should be used where possible. Some recent examples where farmer involvement and acceptance has been high in low cost operations are the S.E. pest management studies and the research into non-wetting sands in the upper S.E. by the Northfield Research Laboratories. The Working Party is concerned that the reduced operating and travelling funds available in SAGRIC were causing a bias against off-centre research and favouring maintaining research on research centres. The Working Party considers that where Regional/Divisional research priorities involve conducting more research off-centre, then the operations of the centre should be reduced and activities such as share farming be considered as a means of introducing more flexibility into the Region/Division research programmes.

4.30 Table 7 assesses the efficiency of each centre by using a number of indices. The Working Party realises that the operation of a centre is complex and the use of indices only provides a broad guide. The following main points are made.

Horticultural Research

4.31 There are none of the statutory Rural Industry Research Funds in the horticultural industries that are found in the animal and grain crop industries. Consequently there is little scope for the number of research officers and support staff on horticultural research centres to be increased through joint industry/Commonwealth funding. Lenswood Research Centre has a lower percentage of funds used for research relative to other centres because of inadequate research staff numbers but the property has a high running cost (expenditure A + D-I). Under current financial restrictions in SAGRIC there is little scope for improving the efficiency of operations of Lenswood Research Centre through an increase in research staff from State Government services. Hence there is a need to examine alternative and more efficient methods of supplying research capacity to the horticultural industries in the Adelaide Hills. All the Horticultural Research Centres need to put more emphasis on publishing the work that is completed.

Cereal/Sheep Research

4.32 The research centres in the cereal/sheep zone are Turretfield, Minnipa and Wanbi. At Turretfield a high proportion of the research expenditure is provided by State Funds, suggesting that the research needs to be more attuned to industry problems in order to attract funding. At Minnipa and Wanbi the amount spent on research is low and the cost per research publication similar to the other centres. As low cost research/ demonstration centres they appear to be working efficiently.

High Rainfall - Grazing

4.33 Kybybolite appears to be the least efficient centre for conducting research and attracting rural industry research funds when compared with Parndana, Struan and Cape Borda. On Kybybolite and Struan more attention should be given to publishing completed research programmes.

Dairy, Pig and Poultry Centres

4.34 Northfield Dairy Research Centre, while having a high expenditure per research officer, appears to maintain a cost per publication and communication of research findings comparable to the majority of the research centres. The high cost of maintaining the centre could be reduced in a different environment, outside the metropolitan area, where the need for security, maintenance of the property and demands from other research groups in the Department are not as great.

4.35 The Northfield Pig Research Unit appears to be an efficient research operation. The very close relationship with the pig industry and the high financial contribution by the local pig industry to the centre through the South Australian Swine Compensation Fund has ensured that this efficiency has continued since the inception of the unit.

4.36 The Parafield Poultry Research Centre had at the time of the survey undergone a separate review by RPAC which has made recommendations to correct the apparent inefficiencies that are shown in Table 7. A number of these recommendations have been implemented.

SUMMARY

4.37 It is evident that a number of research centres are neither efficiently producing research results nor operating as efficient minimum farming operations (expenditure A + D-I).

Recommmendation 2 The research centre management should be encouraged to operate on a more commercial basis to improve the income from the property but without prejudicing research requirements.

4.38 The efficiency of conducting research on the centres varied due to the number of research staff available. The Working Party concluded that the effectiveness and efficiency of the research centres could be easily improved by increasing research officer numbers on each centre but considered that with the present resource constraints in SAGRIC this was not possible. Consequently the Working Party adopted the approach of rearranging the network of research centres so that they could more effectively and efficiently provide research results for the agricultural sector of South Australia.

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5. RESEARCH ON LEASED LAND OR ON PRIVATE FARMS

SCIENTIFIC MERIT OF USING RESEARCH CENTRES COMPARED WITH OTHER SITES

Research

5.1 The development of research technology in crop breeding has been divided into three stages by Sanders and Lynam (1982). They have developed the concept that basic research is conducted on research centres, it is then applied to regional sites and finally tested for viability on many farm sites. Any problems are fed back along the stages and the breeding programme adjusted. It is well documented that the production on research centres does not represent that in the general farming community (Davidson and Martin 1965, Pedersen and Rathjen 1981, Nygaard, 1981). The experiments on the research centres are usually conducted to obtain a maximum biological response which may not be practical under the constraints experienced by most farmers. Consequently new technology derived on research centres may not always be suitable for use on commercial farms. With field crops for example, the biological constraints that may not be found or are usually controlled on research centres are weeds, disease and insects, problem soils, water and soil fertility. The socio-economic constraints on commercial farms may be cost and returns, credit, tradition and attitudes, knowledge and management, input availability and land tenure (Nygaard 1982).

5.2 The Working Party recognised that since a function of SAGRIC is to conduct applied research, resources are needed that allow new technology to be tried and adopted by farmers. A mixture of facilities is thus required. These are a research centre upon which the technology can be developed, regional sites upon which it can be applied and many private farmers who are willing to test the technology in their farming system before it is generally accepted.

5.3 In SAGRIC it was noted that research centres tend to fill two roles - as a place on which to develop technology and as a regional site on which to apply the technology before it is adopted by farmers.

5.4 The requirement for research centre land varied between the disciplines. The officers in the animal sciences required large land areas and in particular felt that control over the experimental work on a day to day basis was crucial even if the work was of an applied nature. Their work was concentrated on research centres or SAGRIC-leased land to make this control possible. The officers in the field crop, pasture, soil, water, pest and disease sciences tended to conduct their work requiring land on regional research centres and private farms.

5.5 The Working Party felt that the commercial situation could be simulated on a regional research centre when new management practices needed to be economically assessed. However, in light of the known differences between the level of productivity of research centres and the average of the district, it may be pertinent to conduct these applied experiments on leased properties or private farms.

Extension

5.6 During the enquiry, several submissions stressed the extension role of research centres. While it is realised that applied research and demonstrations may be conducted on research centres, they are not necessarily regarded by farmers as being representative, even if the centre

is well sited and farmed according to local practice. There do not appear to be any data on the relative value of research centres and private properties as sites for extending research results in Australia. Such an evaluation is needed. Work in developing countries indicated that technology was adopted only when it was shown to fit into the farming system (Sanders and Lynam 1982).

5.7 The Working Party was concerned, particularly in animal research, by the lack of complementary on-farm research work. This may be because of the low number of research officers on some centres. There did not appear to be a shortage of land resource or farm staff to operate the research centres but rather a lack of research officers and technical support for the research. A close examination of the distribution of staffing on research centres is required so that the manpower is available to cover the gap between the research being undertaken and the adaptation of research results to the farming system of the district.

COST EFFECTIVENESS OF RESEARCH CENTRES COMPARED WITH OTHER SITES

5.8 The Working Party felt that SAGRIC had adequate land resources although in some instances they were poorly sited and utilized. To maintain flexibility of operation and to improve farmer acceptability of some of the applied research work undertaken, there is a need to be able to lease property or conduct work on private farms. The major argument put forward in favour of leasing land, usually from an individual farmer's point of view, is that the land base or size of operation can be expanded without using extra capital. Under present Government funding arrangements this argument in favour of leasing would also be true for Government.

5.9 There are, however, a number of economic factors affecting leased land that would make it unwise for SAGRIC to replace research centres with leased land:

(i) Annual lease payments may amount to the current market interest rate of the land value. This payment has to be found each year as a charge on the State's budget.

(ii) Subject to the terms of the agreement, capital improvements made to a leased property to carry out research may be lost or have to be written off at the end of the lease. This is because special circumstances exist in research which require capital improvements to be made which are of little commercial value.

(iii) Capital appreciation of farming land (including research centres) has been considerable over the last 40-50 years. This is likely to continue. These capital gains accrue to owners of the land, not the lessee, a point which obviously favours owning the land.

(iv) The funds required to operate a "government run farm" on a leased property will be similar to the funds needed to operate the farm portion of a research centre and it would be expected that the nett cost (operating - income) will be similar. Also the cost of research will probably be the same for leased land as for SAGRIC owned land (95% of the nett cost of a research centre).

CONCLUSION

5.10 The Working Party considers that on economic grounds SAGRIC should not reduce the level of research centre facilities but rather endeavour to locate them in the most appropriate environment for the agricultural/horticultural industries and regions being serviced. The Working Party appreciates that the research resources in terms of research officers and technical assistants are below the number required to operate an effective programme on many centres but feels that this could be overcome by a redistribution of manpower and a consolidation of research centres. More flexibility is necessary for the management of the research centres to allow for a proper mix of research centre and off-centre research work. Where research priorities in the Region/Division require a leased property or private farm for site specific research, management options such as share farming areas of the research centre should be employed to allow operating funds and research, technical and farm staff to be directed towards achieving the research priorities.

Recommendation 3 *Research Centres should be retained as sites of scientific investigation but should be located so that they represent the farming conditions of the agricultural/horticultural industries and regions being served. They should be consolidated to make more efficient use of manpower. More flexibility in the management of centres should be introduced so that resources can be made available for off-centre research work.*

5.11 Although The Working Party considered that economically it would be preferable to own well-sited research centres, it was agreed that it was desirable to be able to lease land to maintain flexibility of research operations. After examining the Cape Borda lease arrangement the Working Party concluded that a simplified leasing arrangement with a set of acceptable terms needs to be developed.

Recommendation 4

- *That the Department draft a sample lease agreement which specifies the basis for rent negotiation, term of the lease, frequency of rent re-negotiation, responsibility for capital improvements and a method of sharing capital improvements at the end of the lease,*

- *That funding arrangements, such as a deposit account, appropriate to the needs of lease property, be investigated.*

5.12 The Working Party is of the opinion that only where research necessitates complete control of the land should a lease be negotiated. Most small experiments can be conducted on private farms. Where experiments have some risk which may cause a farmer to suffer a loss in production, an indemnity contract should be formalized.

Recommendation 5 *An indemnity contract should be used where high risk experiments are conducted on private properties to guarantee the landholder against loss.*

5.13 The use of research centres as extension and demonstration sites was reviewed by the Working Party; however, there was a lack of data upon which to form an opinion.

Recommendation 6 *That SAGRIC conduct a study to review the relative value of research centres and private properties as sites for extending research results.*

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6. USE OF BEQUEATHED ESTATES

WINKLER ESTATE - SADDLEWORTH

6.1 The late Mr. G.G. Winkler bequeathed his property of 229 ha of farming land to SAGRIC in 1975. Though the will of Mr. Winkler expressed the wish that the Department use the land for experimentation, it is not binding. The property is farmed on a yearly share farming agreement and there is one experiment in progress on the property, due to be completed in 1983. The main points from the review of the property made by the Working Party are as follows:

- The Winkler Estate is in poor repair and would require considerable investment in pasture renovation, buildings and fencing before it could be effectively used as a research centre or outstation of Turretfield Research Centre (estimated $125,000 capital and $35,000 annual operating cost).

- Turretfield Research Centre and Mortlock Experiment Station of the Waite Agricultural Research Institute are also in the high rainfall red brown earths of the cereal belt. This makes it difficult to justify a third centre in this area.

- A number of options exist for either upgrading the property and using it as a research/demonstration farm or selling it and using the proceeds to support research activities elsewhere. Whatever option is taken, the Department is obliged to preserve Mr. Winkler's name and his general intentions.

6.2 The Working Party could not justify the development of the property into a research or demonstration centre.

Recommendation 7 That Winkler Estate be sold and the funds invested in a research facility sited at an appropriate location and incorporating the name of G.G. Winkler.

SIMS FARM - CLEVE

6.3 Sims farm was bequeathed to the Government of South Australia in 1960 by the late Mr. C.L.G. Sims to be made available as "The Gordon Sims Training Farm" or "The Gordon Sims Research Centre". The will is not binding on SAGRIC and the property can be sold. The farm covers 405 ha at the foot of the Cleve hills. A water conservation study is the only major SAGRIC project and is due to be completed in 1984. During the course of this review 109 ha were approved for transfer to the Cleve Area School. The remainder is leased to a local farmer and the lease is paid for as capital improvements to the property.

6.4 The Working Party reviewed the site and the main points arising from that review are:

- The soil type is not representative of Eyre Region.

- The area is not suitable for livestock research because the area is too undulating and variable for constructing replicated paddocks for animal/pasture relationship experiments and there are no facilities for handling groups of animals.

- The farm is too far from Minnipa for it to be effectively run as an outstation.

6.5 The Working Party agreed that the land of G. Sims' Farm under SAGRIC control should be sold and the proceeds used to purchase land in the dune swale country. This would provide a centre with soils and topography more representative of Eyre Region for soil/plant research work. The name of Gordon Sims should be used to honor his intentions for the land.

Recommendation 8 The land of G. Sims' Farm that is under SAGRIC control should be sold and the proceeds used to purchase land for research in the dune swale country.

7. FUTURE NEED FOR, OPERATION AND LOCATION OF RESEARCH CENTRES

7.1 The Working Party considered that a number of research centres are not effectively or efficiently conducting research for the industries or regions they serve, either being in an unsuitable location particularly with respect to future requirements; having insufficient research staff numbers; or having an imbalance in staffing with respect to research officers and technical assistants. In addition a number of centres have achieved the objectives set when the land had been acquired.

7.2 In developing the future requirements for research centres in SAGRIC, the Working Party designed a plan which would provide research centre capacity to serve both the agricultural industries and horticultural industries and the specific requirements of each region. The existing research centre resources were then fitted into that plan taking into consideration location, balance and aggregation of staffing between centres, and the current and projected future needs of the rural and horticultural industries in South Australia. Recommendations have been made only where the Working Party considers that changes are required to the existing research centre structure. The approach taken in developing a set of recommendations provides for a capital restructuring of the present research centre resources available to the Department.

CENTRAL RESEARCH FACILITY

7.3 The Working Party agreed that there should be a central group of research staff located in the Divisions of the Department and working on specific industry problems across the Regions. This need is provided for by the Northfield Research Laboratories. The Working Party recognised that co-ordination and co-operation between the central research facility and the Regions was necessary to ensure that the research work was relevant and applied. Further opportunity for transfering staff to regions should be explored.

HORTICULTURAL RESEARCH

7.4 There are three horticultural areas in South Australia - the irrigated area of the River Murray, the cool climate area of the Barossa Valley and the South East, and the temperate areas of the Adelaide Hills and Northern Adelaide Plains.

7.5 The outlook for the horticultural industries indicate that there is an urgent need to improve efficiency of production and facilitate adjustment. The Working Party sees a continuing role for research centres servicing the horticultural areas of the Barossa, the Riverland, the South East and Adelaide Hills and Plains in the conduct of research into new technology and industry problems.

7.6 The Working Party considered that Loxton Research Centre with its present facilities adequately serves the Riverland area. However a need was identified to increase the area of citrus and other potential crop plantings for research. The Nuriootpa Research and Advisory Centre was considered to be adequately serving the cool climate grape growing areas including those in the South East. In reviewing the Lenswood Research Centre it was concluded that it was costly to operate and inadequately staffed with research officers. The Working Party felt that the work of the centre could be more effectively conducted by relocating the research staff to the Nuriootpa Research and Advisory Centre and Northfield Research

Laboratories where they may work with a group already serving the horticultural and viticultural industries in propagation, new varieties, disease control and post harvest research. Following the sale of Lenswood Research Centre the advisory staff located at Lenswood should be relocated to a district office at Mount Barker in the Adelaide Hills to provide the daily contact that growers require. The propagation of trees could be shared between the Northfield Horticultural Research Unit and the new facilities of the Nuriootpa Research and Advisory Centre.

7.7 There were a number of requests from industry to form a Vegetable Research Institute to be located on the plains north of Adelaide. Vegetable production in South Australia is very diverse both in the type of crops grown and the location. The main areas concerned are the northern Adelaide Plains, the Adelaide Hills, the irrigation areas of the Upper and Lower Murray River Basin and the South East. The Working Party found that there was a significant research input being made into those areas from officers based at Northfield Research Laboratories, Central Region and Loxton Research Centre. If a Vegetable Research Institute was established in the northern Adelaide Plains the flexibility of vegetable research would be reduced and the additional overhead costs of establishing another research unit in SAGRIC would be incurred. The Working Party thought that it would be preferable to locate staff at an existing facility where glasshouses and land were already available. The staff numbers should reflect the research needs of the industry, taking into account the research technology that can be adopted from the vegetable research groups operating in Victoria, New South Wales and Queensland. It was felt that there was a need to formalize the co-ordination of vegetable research both within South Australia and with interstate organizations.

Recommendation 9 Horticultural Research (1) That Loxton Research Centre be provided with a new site for research into citrus and other potential crops for the Riverland.

(2) That Lenswood Research Centre be sold, a district office established at Mount Barker to accommodate advisory staff and that the research officers and facilities at Lenswood be re-located to the Nuriootpa Research and Advisory Centre and Northfield Research Laboratories.

CEREAL SHEEP ZONE - NORTHERN ADELAIDE PLAINS AND YORKE PENINSULA

7.8 The traditional mixed farming of this region has in recent years become more specialized as a result of the higher returns being obtained for cereal and grain legume crops compared with the livestock industries. Many farmers have sold off their small dairy herds and pigs and are concentrating on grain crops, with mainly sheep or some cattle complementing the cereal/ pasture rotations. This trend is expected to continue in the foreseeable future. There are many problems facing this zone. As the intensity of cropping increases plant diseases become more prevalent and maintaining productive pasture species in the rotation is more difficult. A list of needs was presented in the workshop on the cereal zone conducted by the Research Policy Advisory Committee (Wickes, 1983). Some of these needs are:

- to control cereal diseases in more intensive cropping systems
- to find insect resistant pasture species for the cereal/sheep zone

- to determine the effect of different cropping rotations and cropping intensity on the long term stability of the soils
- to find a new grain legume for the low rainfall areas
- to determine the effect of grain legumes on soil nitrogen content
- to understand the dryland farming system and changes that are occurring in it
- to provide information on methods of chemical weed control

7.9 The northern Adelaide Plains and Yorke Peninsula have two distinct soil associations. These are the neutral to slightly acid red brown earths usually associated with a high rainfall, and the slightly alkaline sandy mallee type soils associated with a lower rainfall. The Working Party noted that the red brown earth area was represented by two research centres namely Turretfield Research Centre and the Mortlock Experimental Station of the Waite Agricultural Research Institute.

7.10 Turretfield is located on the edge of the high rainfall zone in a favoured agricultural environment. The soil type is similar to that at the Rutherglen Research Institute, Victoria, where animal, crop and pasture research work is being undertaken by the Victorian Department of Agriculture. Many of the principles developed could be adapted fairly easily to the S.A. red-brown earth area. Much of the research on Turretfield Research Centre is in the animal production area and is not site specific. Work on soil/plant relationships is minimal because the environment is not representative of a large proportion of the cereal-sheep zone.

7.11 It is the opinion of the Working Party that the activities of Turretfield Research Centre should be transferred to a research centre representing the sandy loam, medium rainfall area of the cereal-sheep or dryland farming zone. This should also provide an opportunity for a new emphasis for research work by having facilities in an environment which has not previously been covered, particularly for medic pasture research work. This would also provide a site for demonstrating the dryland farming system to overseas countries where there is an interest in medic pasture rotations in a sandy loam environment of 350 to 400 mm rainfall. SAGRIC could negotiate with the Waite Agricultural Research Institute for access to land at the Mortlock Experimental Station and thus still provide a site for research into soil/plant relationships for the red-brown earth high rainfall environment of the cereal-sheep or dryland farming zone.

Recommendation 10 Cereal/Sheep Zone - northern Adelaide Plains and Yorke Peninsula (1) That the Turretfield Research Centre be sold and the activities transferred to a new site in the alkaline mallee soil.

(2) That negotiations be undertaken with the Waite Agricultural Research Institute for SAGRIC for access to land on the slightly acid red brown earth area on Mortlock Experimental Station.

HIGH RAINFALL - GRAZING ZONE

7.12 The major industries in the high rainfall grazing areas of South Australia are sheep for meat and wool, beef cattle for meat and dairy cattle for milk and milk products. There is an increasing interest in growing cereal, oilseed and grain legume crops in this zone particularly where pastures are being renovated and where irrigation is available. Consequently there is a need for research facilities in which research staff can conduct animal and pasture research and also investigate irrigated crops as well as winter crops.

7.13 There are three research centres in this area namely Struan Research Centre, Kybybolite Research Centre and Parndana Research Centre. Much of the work conducted on these centres at present is not site-specific and could be more effectively and efficiently done if it were consolidated.

7.14 The two research centres in the South East of S.A. were considered by the Working Party to provide the major resource for high rainfall non-site-specific research work. It was noted that Kybybolite Research Centre was originally developed in 1905 to provide information for settling the land. Much of the soil/plant research that forms the basis of the present agriculture in the area was completed in the 1950's and 1960's. Most of the recent research projects on the centre are not site-specific and could have been conducted, with the same facilities, at another site. Struan Research Centre has in recent years developed into the major research centre in the South East, being involved in both sheep and beef cattle research work. The Working Party felt that there would be a number of advantages in transferring the work and facilities of Kybybolite Research Centre to Struan Research Centre, namely:

- The research group working on the centre would be expanded to more than 6 research officers.
- The research activities would be amalgamated, allowing more flexible use of the technical staff and general hands.
- The research facilities would be improved.

7.15 The Working Party noted that the land at Struan Research Centre is predominately on heavy Rendzina soils that are prone to flooding. To enable sufficient flexibility for small paddock work it would be necessary to purchase a suitable area of the higher land adjacent to Struan Research Centre.

Recommendation 11 High Rainfall Grazing Zone - That the Kybybolite Research Centre be sold and the activities transferred to Struan Research Centre; that the proceeds from the sale be used to purchase land adjacent to Struan and to improve the Struan facilities.

7.16 The Working Party, having established that the Struan Research Centre in the South East would be the major resource centre for sheep and beef cattle research in the high rainfall areas of South Australia, considered the specific research requirements of the southern Adelaide Hills and Kangaroo Island. Parndana Research Centre was originally established to assist in developing an agriculture for Kangaroo Island. In recent years the research has become more general and there are problems of maintaining staff on the island because of the isolation from other officers and

libraries. Also there are only a small number of producers benefiting from the research.

7.17 There has in recent years been a major rationalization of the dairy industry in South Australia and this has contributed towards the present stability of the industry. Dairying has contracted towards the high rainfall area of Fleurieu Peninsula, the lower River Murray irrigation area, and Mount Gambier. It is expected that a major dairy producing area will remain in the southern Adelaide Hills to provide whole milk for Adelaide. The Northfield Research Centre is, however, located in a dryland farming environment which relates only to the limited dairying conducted in the northern Adelaide Plains. There are also other pressures on Northfield such as the isolation of the centre from other dairying areas and the continual pressure for the land close to the city for development.

7.18 The Working Party considered that the southern Adelaide Hills was the preferred site for dairy research in the future and agreed that dairy research could be combined with other research for industries pertinent to Kangaroo Island and the southern Adelaide Hills. The selection of the site should also include a potential for irrigation research in view of the amount of irrigation in use in the southern Adelaide Hills and in the dairying industry of S.A. The regional specific work of both the southern Adelaide Hills and Kangaroo Island could be conducted by a research group based in the southern Adelaide Hills but using leased land or farmer owned land in the southern Adelaide Hills and on Kangaroo Island for conducting the site-specific work.

Recommendation 12 That the dairy research and the high rainfall regional research for the Adelaide Hills and Kangaroo Island be relocated to a new site in the southern Adelaide Hills. This would involve the sale of the paddocks south of Folland Avenue and east of the security complex at Northfield Research Centre and the sale of Parndana Research Centre.

CEREAL/SHEEP ZONE - MURRAY MALLEE

7.19 A report on the "Research Needs in the Murray Mallee 1978" (Fawcett *et al.* 1978), listed a number of research areas that needed to be considered but suggested that a research centre should only be retained in this zone if it were to be actively used in research. Since then there has been a change in the administration of the Wanbi Research Centre with a research/demonstration programme being developed to serve the Murray Mallee. Part of the Wanbi Research Centre was acquired under the Soil Conservation Act (1939-1960) and now that it is restabilized may be sold by the Minister of Agriculture.

7.20 The Working Party identified the need for a research/demonstration centre with a low annual operating cost in the Murray Mallee, to adapt new farming practices and demonstrate how they can be used to increase production in this fragile environment. A number of demonstrations have already shown how the sandy soils may be stabilized and a number of current demonstrations are showing how productivity may be improved through the introduction of cattle and the use of new tillage techniques.

7.21 It was concluded that the present location of Wanbi Research Centre site was suitable because (a) it is centrally located, (b) it represents some of the more difficult soil types to manage in the zone and (c) a large research programme is being successfully conducted on the other major soil

type of the Murray Mallee around Lameroo on a commercial farm. The Working Party considered that a Manager should be approved for Wanbi Research Centre to effectively manage the research/demonstration work.

Recommendation 13 Cereal/Sheep Zone - Murray Mallee: That a manager be appointed to Wanbi Research Centre.

CEREAL/SHEEP ZONE - EYRE PENINSULA

7.22 Because of the relative isolation of the Eyre Region it is difficult for the farmers to visit and view the new technology being developed and demonstrated at the major research centres east of Spencer Gulf. The annual field day at Minnipa Research Centre is attended by nearly 500 farmers who come to view the demonstrations of new farming techniques such as herbicide treatments, tillage methods and selection of grain crops and pasture species. The demonstrations are often modelled on research work conducted at other SAGRIC research centres. There is also need for research which solves problems specifically relating to the environment of Eyre Region such as the selection of pasture, cereal and grain legume species which suit the environment, examination of the sheep and cattle selection, husbandry and nutrition practices and an examination of different cropping systems.

7.23 The Minnipa Research Centre is located on a soil type representative of only a small area of Eyre Peninsula. It is ideal for the original purpose of the Centre of seed multiplication, mainly because of the higher yields of grain that can be obtained compared with the more common sandy dune swale soils of the Eyre Region.

7.24 The Working Party considers that land should be purchased on the dune swale country on which soil/plant research work can be conducted and would be of direct application to a large portion of Eyre Peninsula. The options to be considered are either to develop a small outstation of Minnipa Research Centre or to sell Minnipa Research Centre, purchase a large area of land and move the total operation into the dune swale country.

7.25 The Working Party considered locating a research centre further south in the high rainfall area of Eyre Region but it was agreed that the research required in this area was site specific and could be conducted with the appropriate on-farm experiments. The higher rainfall technology that was not site specific and developed on the South East and southern Adelaide Hills research centres could be directly transferred to the higher rainfall areas of Eyre Region.

Recommendation 14 Cereal/Sheep Zone - Eyre Region The Working Party proposed that two options should be considered:-

Option 1. Sell the balance of Sims Farm and invest the proceeds in an outstation of Minnipa Research Centre called the Gordon Sims Research Farm, located south of Minnipa.

Option 2. Sell the balance of Sims Farm and the Minnipa Research Centre and establish a new research centre in the dune-swale country with a portion called the Gordon Sims Research Farm.

7.26 On balance the Working Party favoured Option 2 because (i) the whole area of the centre would be on a soil type more representative of the major soils on Eyre Region, (ii) research staff appointed to the centre would prefer to establish their field plots requiring daily attention close to the office and farm facilities and on dune swale country, (iii) demonstration/field days would be disjointed if the activities to be viewed were over two sites and (iv) two properties would make the management more difficult and would require an increase in weekly paid staff resources and the operating costs of the centre.

7.27 The Working Party noted that there were difficulties in maintaining research and technical staff at Minnipa Research Centre because they had been working in isolation from their peer scientific group. The research capacity of Eyre Region at present relies on officers from other regions establishing experiments and demonstrations. The Working Party identified two options (i) re-locate positions to Minnipa Research Centre (or its replacement) to develop a viable centre of research for Eyre Region or (ii) rely on the present system of research officers from Port Lincoln or other regions visiting the centre. The second option was favoured by Radcliffe (1976) and Walker *et al.* (1977), and is supported by the Working Party. However, adequate technical officer support is necessary.

Recommendation 15 That the staffing of Minnipa Research Centre (or its replacement) be provided by means of adequate technical officer support for projects implemented by research officers located at Port Lincoln and in other Regions/Divisions.

PASTORAL ZONE

7.28 The Working Party could not justify developing a research centre in this zone. The Working Party recognised the co-operation of the Nicolson family and the investment that the State Government has in facilities on the Middleback Station near Whyalla, and could see no reason to duplicate this. Much of the research in this region involved extensive survey work monitoring vegetation changes with different stocking intensities, and cattle management procedures or small enclosure work examining the effect of different animals on the vegetation in selected localities. The vast area and the many different ecotypes in this region required a multi-disciplinary group which could be based at Port Augusta. The Working Party agreed that there was inadequate work being conducted in this region and were of the opinion that the officers working on vertebrate pest, pest plants and ecologists working from Adelaide were isolated from the region in which their programmes were conducted. More research and extension is required particularly in animal husbandry given the large sheep and cattle population of this region.

Recommendation 16 Pastoral Zone - That a research group be established at the Northern Region Headquarters and that it operate as a mobile unit on the research problems of the pastoral zone.

PIG RESEARCH

7.29 The Working Party considered the need for and location of a pig research establishment in the Department. Standing Committee on Agriculture had considered the rationalization of pig research in Australia in 1982 and identified South Australia as having the specialist area in pig research of herd health and management research. The Working Party agreed with this

recommendation and since pig research was not site specific, a central location easily accessible to producers and markets was required. The present Northfield Pig Research Unit is centrally located and well supported by the pig industry. An adequate buffer from the metropolitan area must be maintained around the centre.

POULTRY RESEARCH

7.29 The Parafield Poultry Research Centre has already been extensively reviewed by the Research Policy Advisory Committee. Standing Committee on Agriculture in 1982, in rationalizing poultry research in Australia, identified Parafield as representing the specialist research areas of energy metabolism and nutrition in relation to egg quality. The Working Party agreed that SAGRIC needed to continue to provide a poultry research facility for the industry. Since poultry research was not site specific, the present location was suitable. There were no problems that the Working Party were aware of with the local council or community that would force Parafield Poultry Research Centre to be moved from its present location. The centre did, however, require a buffer zone from the local community to reduce vandalism and unnecessary community awareness of the activities of the Centre. The buffer is presently provided by the Parafield Plant Introduction Centre.

PLANT INTRODUCTION

7.30 The Working Party reviewed the activities of the Parafield Plant Introduction Centre. It was necessary to maintain the site as a buffer for the Parafield Poultry Research Centre. Standing Committee on Agriculture has recognised South Australia as being the national genetic resource centre for medic breeding and research. However, the Working Party could see merit in reviewing the need for two locations and rationalization of the plant introduction and breeding work conducted at both Parafield and Northfield. This, however, was outside the terms of reference of the present review and was in any case being addressed by the Northfield Planning and Development Working Party and Plant Industry Division. If there is any transfer of the plant introduction activities from Parafield, the land should be either controlled by the Animal Industry Division or an alternative use sought.

SUMMARY

7.31 The effect of these changes on the location of the research centres is provided in figure 3. It can be seen that each geographical zone and specialized industry would have a research centre on which relevant research programmes could be conducted. The research centres, being located in these zones, will be able to adjust their mix of research activities to reflect the changes that occur in agricultural production in the zones.

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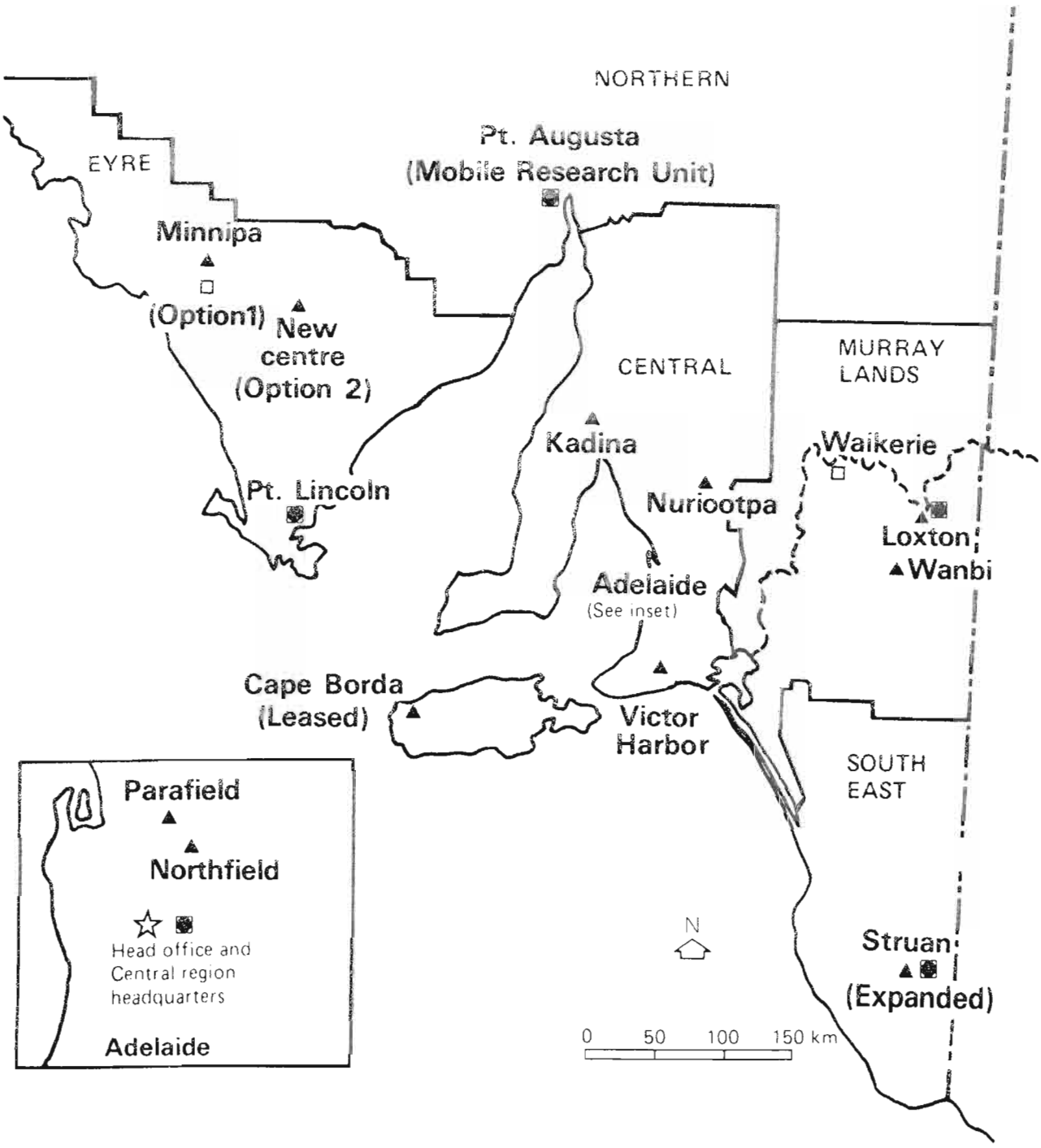
Figure 2: The proposed plan for the future location of SAGRIC Research centres in South Australia

☆ HeadOffice
◉ Regional Headquarters
▲ Research Centres
□ Outstations



8. PROPOSED METHOD OF CAPITAL RESTRUCTURING OF THE RESEARCH CENTRES

INTRODUCTION

8.1 The Working Party felt that a plan was needed for the implementation of the recommendations in Chapter 7. The financing and scheduling of the recommendations are designed as a self contained programme. However, there may be some bridging capacity required from Treasury between transactions.

8.2 The amount of capital expected is based on the best estimate available in 1981-82. The Working Party is confident that the indicative budget outlined demonstrates the feasibility of the recommendations given in the report. The aim of the proposed capital restructuring of the research centre resources is to provide a more effective and efficient research resource for the S.A. agricultural community.

8.3 Long term experiments are being conducted on research centres. Hence, to provide a continuity of research output, the plan has allowed time for the purchase and establishment of the new facility and relocation of the research before a centre is sold. A number of facilities on different centres are substandard and require upgrading. Allowance was made for improving the office and laboratory accommodation where possible.

8.4 Many houses on a number of research centres that are not occupied by SAGRIC staff. Staff have chosen to purchase their own home in the surrounding area. Thus in developing the plan, a minimum number of residences were recommended for each centre for the manager and a number of staff who would be required to reside on the centre to maintain security and react to emergencies.

PROPOSED PLAN OF OPERATION

8.5 The proposed plan provides a time schedule of transactions for capital restructuring and a detailed plan of the necessary staff changes that will occur. The capital restructuring has been based on a minimum time sequence of three years. The Working Party realizes that this would be difficult to achieve because of delays in finding suitable sites for relocation. However the Working Party suggests that the implementation of the proposed plan be undertaken as rapidly as possible to reduce staff morale problems associated with the changes. The staff changes have been made to attempt at establishing the research centres with a group of a minimum of 5 research officers and associated assistants. This cannot be achieved on all centres identified as having a research role. It is suggested that in future staff from the Divisions be relocated to increase the numbers on these research centres.

(A) Capital Restructuring

8.6 The following section lists the sale and purchase of the properties that would have to be made. A summary of the transactions appears in Table 10. The overall result of the capital restructuring is a surplus of $1.94 m if option 1 is taken and $1.45 m if option 2 is taken for Eyre Region. The Working Party considers that this surplus is necessary to act as a buffer against inflation, and ensuring the correct siting of the new centres.

(1) Sale of Properties

(i) Sale of Lenswood Research Centre

			$
Land			
79 hectares	@ $3,000/hectare		237,000
Buildings:	ATCO Room		3,000
	Boiler		2,000
	Double garage		600
	Implement shed		3,000
	Workshop		4,000
	Houses 4 @ 30,000		120,000
Equipment:	Tractors (4)		4,400
	Agricultural equip.		8,650
		Total	$382,650

An allowance will have to be made to maintain the VLSVO Radio transmission aerials and base transmitter.

∴ Less 4 hectares of scrub @ $3,000/hectare $ 12,000

TOTAL CAPITAL REALISED $370,650

(ii) Sale of Parndana Research Centre

		$
Land	497 ha @ $400/ha + 1 house, shearing shed, implement shed, hay shed.	198 800
Buildings	9 Houses @ $5 000 (salvage)	45 000
	1 Office Block (salvage)	10 000
	1 Hay Shed	6 000
	1 Super Shed	3 000
	1 Implement Shed	2 000
	1 Workshop	2 000
	1 Meat Room	-
	1 Pasture Room (salvage)	2 000
	1 Barn	8 000
	2 Silos	2 000
	2 Heater Storage Tanks	1 000
	1 Water Tower	3 000
	1 Cattle Yard & Scales (salvage)	2 000
	Total Buildings	$86 000

Equipment	8 Vehicles	32 500
	4 Tractors	20 800
	Farm Equipment	34 300
	Total Equipment	$87 600
	less 1 Vehicle retained on Island	5 000
	Net Equipment Value	$82 600
	TOTAL CAPITAL REALISED	$367 400

(iii) Sale of Northfield Research Centre Dairy Land

(All the paddocks in the area South of Folland Avenue and east of the security fence delineating the Pine Drive complex).

		$
Land	144 hectares @ $30 000 (estimate from 1980 HURA value)	4 290 000
Buildings -	1 Folland Ave. Dairy	50 000
	3 Hay Sheds (transfer)	-
	Fencing (salvage 40 km @ $400/km)	160 000
	2 Cattle Yards (transfer)	-
	10 Silos (transfer)	-
	Workshop & Sheds	
	4 Houses 1 @ $35 000	35 000
	3 @ $30 000	90 000
Farm Equipment (transfer)		-
	TOTAL CAPITAL REALISED	$4 625 000

(iv) Sale of Turretfield Research Centre

Land	508 hectares @ $ 1 100/ha	558 800
	143 hectares @ 800/ha	114 400
		$673 200
Buildings	Holland House	40 000
	5 Houses @ 5 000 (salvage)	20 000
	4 Houses (retained for rental)	-
	1 House @ 5 000 (salvage)	5 000
	1 House @ 2 000 (salvage)	2 000
	Brick office and laboratory block (salvage)	20 000
		$87 000

Improvements	Shearing Shed and Yards	14 000
	Animal Shed (transfer)	-
	Cattle Yards	4 000
	Tractor Shed - Workshop	14 000
	Implement Shed	10 000
	Vehicle Shed (transfer)	-
	Barn (mouse proof)	4 000
	Barn Store (seed grading)	8 000
	Barn Store	4 000
	Fertilizer Shed	4 000
	Weighbridge (transfer)	-
	2 Hay Sheds	1 200
	Store Shed	2 000
	Toilet Block	500
	Steel Silos (transfer)	-
		$65 700
Farm Equipment (transfer)		
	TOTAL CAPITAL REALISED	$825 900

(v) Sale of Winkler Estate, Saddleworth

		$
Land	229 ha @ $600/ha	137 400
	TOTAL CAPITAL REALISED	137 400

(vi) Sale of Sims Farm, Cleve

Land	293 hectares @ $550/hectare	=	161 000
	TOTAL CAPITAL REALISED		$161 000

(vii) Sale of Kybybybolite Research Centre

Land	307.8 hectares @ $1 125/ha	346 275
Improvements -	Silo	4 000
	Sheds	12 000
	Houses ($5 000 @ 8)	40 000
	Laboratory (salvage)	20 000
		$422 275

Machinery

Tractors, 4 sold		10 000
Haymaking equipment	= Econ. fodder roller	3 000
	= new Holland baler	2 500
		$15 500
TOTAL CAPITAL REALISED	=	$437 775

(viii) Sale Minnipa Research Centre

Land	1,200 ha @ $200/ha	=	$240 000
Buildings	1 House @ $25,000		25 000
	8 Houses @ $5,000		40 000
	Barn		1 000
	Office block		5 000
	Hay Shed		5 000
	Workshop		3 000
	Implement Shed		10 000
	Shearing Shed		1 000
	New Shearing Shed		25 000
	8 Silos (transfer)		-
Equipment	Weighbridge (transfer)		-
	Fuel tanks (transfer)		-
	TOTAL CAPITAL REALISED		$355 000

(2) Purchase of Properties

(i) Mount Barker District Office	$
Establishment of office on lease property	60 000
TOTAL CAPITAL COST	$60 000

(ii) Purchase new Southern Hills Centre - Site - near to Victor Harbour	
1) Purchase of land close to Victor Harbour 300 hectares @ $2 000/hectare	600 000
2) Provide animal house facilities	10 000
3) Internal fencing 17 km @ $1 500/km & water	30 000
4) Implement sheds and workshop 4 @ $15 000	60 000
5) Transfer of silos and hay sheds (10 silos, 3 hay sheds)	10 000
6) Upgrading Dairy facilities	50 000
7) Purchase cattle feed shed and cattle yards	100 000
8) Men's quarters	60 000
9) Build laboratory and office building for: 6 Research Officers 6 Field staff Laboratory space	600 000
10) *Houses (2) for security $30 000	60 000
TOTAL CAPITAL COST	$1 580 000

* An assumption taken is that staff would purchase or rent accomodation in Victor Harbour except for 2 dairy hands and 1 manager. The manager's house will be expected to be purchased with the property.

(iii) Purchase of a Cereal/Sheep Research Centre, Northern Adelaide Plain Site - near to Kadina*

1)	Purchase of 800 hectares ($1 000/hectare) close to Kadina	800 000
2)	Provide office and laboratory accommodation (Manager, Clerk, 7 RO's, Laboratory facilities)	600 000
3)	Provide housing - 1 Manager	30 000
	2 Farm Staff	60 000
4)	Transfer Animal Shed, Silos, equipment	20 000
**5)	Develop Seed Certification Centre	250 000
*6)	Men's quarters	60 000
7)	Implement sheds 3 @ $15 000	45 000
8)	Upgrade shearing shed - yards	20 000
9)	Weighbridge transfer	10 000
10)	Internal fencing and watering	40 000
	TOTAL CAPITAL COST	$1 935 000

* An assumption taken is that most staff would purchase or rent accomodation in Kadina.

** The Seed Certification Centre would be an improved facility incorporating new equipment recently purchased at Turretfield.

(iv) Purchase of High land Adjacent to Struan

1)	Purchase of land adjacent to Struan on non-waterlogging soils - 300 hectares @ $1 200	=	360 000
2)	Provide animal house facilities (move Kybybolite animal house)		12 000
3)	Subdivide area into suitable paddocks and water ($1 568/km) for fencing (17 km))		30 000
4)	*Provide office accommodation for officers and laboratory space - include upgrade of existing Struan Research Centre (i.e. 5 more offices, laboratory space and mens room)		600 000
	TOTAL CAPITAL COST		$1 002 000

* Note: This building would be an upgrading of the facilities at Struan Research Centre.

(v) Purchase Citrus Land Riverland

3 ha @ $10 000 (at Waikerie)	$30 000
TOTAL CAPITAL COST	$30 000

(vi) Upgrade Wanbi Research Centre

(a) 10 km fencing	$ 15 600
watering facilities	$ 5 000
(b) Office accommodation and herbage laboratory	$200 000
TOTAL CAPITAL COST	$220 600

(vii) Option 1 for Eyre Region - Purchase of an Outstation Site - South of Minnipa

1) Cost of land 400 hectares @ $180	=	72 000
2) Improvements: House		40 000
Tractor (second hand)		15 000
Combine (24 row)		3 500
Fencing 10 km @ $1,560/km		15 600
Shed		5 000
Truck		20 000
TOTAL CAPITAL COST		$171 100

(viii) Option 2 for Eyre Region - Purchase of a new Eyre Region Research Centre
Site - South of Wudinna*

Land 2,000 ha @ $180/ha	$360 000
Buildings	
1 House @ $25,000	25 000
2 Houses @ $40,000	80 000
1 Hay Shed (5,000 bales)	5 000
2 Implement Sheds @ $10,000	20 000
1 Workshop	10 000
1 Farm Office	400 000
1 Shearing Shed	25 000
1 Men's quarters	50 000
Transfer of Silos	10 000
Fencing 20 km @ $1,540	30 800
Equipment	
All transferred	-
TOTAL CAPITAL COST	$1 015 800

* The assumption made is that most staff can rent or purchase accomodation in Wudinna.

TABLE 10

CAPITAL RESTRUCTURING - SOURCES AND USES (1981/82 VALUES)

OPTION 1 - Purchase of an outstation for Minnipa Research Centre

Source	$ (m)	Uses	$ (m)
Northfield Dairy	4.62	Southern Hills Centre	1.58
Kybybolite	0.44	South East-Struan	1.00
Turretfield	0.83	Cereal/Sheep Zone - mid North	1.93
Lenswood	0.37	Eyre Region outstation	0.17
Winkler Estate	0.14	Citrus Land	0.03
Parndana	0.37	Upgrade Wanbi R.C.	0.22
Sims Farm	0.16	Mt. Barker Office	0.06
TOTAL	$6.93 m	TOTAL	$4.99 m

Uncommitted = $1.94 m

OPTION 2 - Sale of Minnipa Research Centre and purchase new Eyre Region Research Centre

Source	$ (m)	Uses	$ (m)
Northfield Dairy	4.62	Southern Hills Centre	1.58
Kybybolite	0.44	South East-Struan	1.00
Turretfield	0.83	Cereal/Sheep Zone - mid North	1.93
Lenswood	0.37	Eyre Region Research	1.01
Winkler Estate	0.14	Citrus Land Option 2	0.03
Parndana	0.37	Upgrade Wanbi R.C.	0.22
Sims Farm	0.16	Mt. Barker Office	0.06
Minnipa	0.35		
TOTAL	$7.28 m	TOTAL	$5.83 m

Uncommitted = $1.45 m

TABLE 11

CAPITAL RESTRUCTURING BROKEN INTO 5 SEPARATE PROJECTS

	*Time Span (months) for each project	($) m Cost/return	($) m Cumulative Total
PROJECT 1 - Southern Hills			
(1) Establish Mt. Barker District Office	0	- 0.06	- 0.06
(2) Sell Lenswood R.C.	6	+ 0.37	+ 0.31
(3) Sell Parndana R.C.	6	+ 0.37	+ 0.68
(4) Purchase Citrus Land Waikerie	6	- 0.03	+ 0.65
(5) Purchase Southern Hills R.C.	6	- 0.6	+ 0.05
(6) Sell first section Northfield R.C.	12	+ 0.93	+ 0.98
(7) Establish southern Hills R.C.	12	- 0.98	+ 8.00
(8) Sell remaining Northfield R.C.	24	+ 3.69	+ 3.69
PROJECT 2 - Eyre Region			
Option (1)			
(1) Sell portion of Sims Farm	0	+ 0.16	+ 0.16
(2) Purchase outstation to Minnipa R.C.	6	- 0.17	- 0.01
Option (2)			
(1) Sell portion of Sims Farm	0	+ 0.16	+ 0.16
(2) Purchase new Eyre R.C.	24	- 1.01	- 0.85
(3) Sell Minnipa R.C.	36	+ 0.34	- 0.50
PROJECT 3 - Mid Northern Adelaide Plains			
(1) Sell Winkler Estate	0	+ 0.14	+ 0.14
(2) Purchase Mid North R.C.	12	- 0.80	- 0.66
(3) Provide facilities at new R.C.	24	- 1.13	- 1.79
(4) Sell Turretfield R.C.	36	+ 0.83	- 0.96
PROJECT 4 - South East			
(1) Purchase highland	24	- 0.36	- 0.36
(2) Develop new facilities	24	- 0.64	- 1.00
(3) Sell Kybybolite R.C.	36	+ 0.44	- 0.56
PROJECT 5 - Murraylands Region			
(1) Upgrade Wanbi R.C.	36	- 0.22	- 0.22

* The time span given of 36 months is the minimum that could be attempted. The Working Party considers this to be ambitious but urge the project be completed as soon as possible to limit the uncertainty that staff experience during the period leading up to change.

TABLE 12

SCHEDULE OF CAPITAL RESTRUCTURING OVER TIME ASSUMING ALL PROJECTS ARE UNDERTAKEN AT THE SAME TIME

Time (months)	Project 1 Sth Hills	2 Eyre	3 North Adelaide Plains	4 S.E.	5 Murray Mallee	Cumulative Total ($m)
Option 1						
0	- 0.06	+ 0.16	+ 0.14	-	-	+ 0.24
6	+ 0.11	- 0.17	-	-	-	+ 0.18
12	- 0.05	-	- 0.80	-	-	- 0.67
24	+ 3.69	-	- 1.13	- 1.00	-	+ 0.89
36	-	-	+ 0.83	+ 0.44	- 0.22	+ 1.94
Option 2						
0	- 0.06	+ 0.16	+ 0.14	-	-	+ 0.24
6	+ 0.11	-	-	-	-	+ 0.35
12	- 0.05	-	- 0.80	-	-	- 0.50
24	+ 3.69	- 1.01	- 1.13	- 1.00	-	+ 0.05
36	-	+ 0.35	+ 0.83	+ 0.44	- 0.22	+ 1.45

8.7 The capital restructuring has been broken up into five projects in Table 11 according to the different geographic areas of South Australia. The only project that provides surplus capital is project 1 and consequently should be the first project undertaken. The Working Party, however, considers that all projects should be undertaken by a specialist team appointed to the task, in order to complete the programme as quickly and efficiently as possible. Table 12 has been developed to indicate that the complete programme could be undertaken in three years with only a small amount for bridging finance from Treasury. It is recognised however that it may take longer and bridging finance may be required for longer. The sale and purchase price assumptions and other financial details would need to be continually revised.

(B) Manpower and Operating Re-allocation

8.8 The Working Party developed the plan to work within the existing resources available to SAGRIC. Although the proposed restructuring does not reduce the total effective land area for research, it does provide an opportunity to increase the strength of the staff numbers on each centre and hence, create conditions for improved research productivity. In tables 13 and 14 the implications of changes in staff allocation resulting from the restructuring of the research centres is given. The number of research officers in the groups is increased although Minnipa, Wanbi, Nuriootpa and Parafield Poultry Research Centres are below the ideal minimum of 5 research officers. Minnipa and Wanbi have been established as research/ demonstration centres not requiring any resident research officers but with technical staff who can conduct the field work. The Nuriootpa Research and Advisory Centre has had an increase in research staff and there is the interaction available with the many extension officers also housed in the same building. The number of officers at Parafield Poultry Research Centre is only one below that recommended for this centre by a previous Research Policy Advisory Committee Working Party.

8.9 The preferred ratio of 2 technical assistants to each research officer has not been achieved. There may be scope to exchange general-hand positions for technical assistant positions on some centres. Further positions could be sought from Rural Industry Research Fund sources.

TABLE 13

MANPOWER AND OPERATING CHARGES ON THE RESTRUCTURING OF RESEARCH CENTRES JUNE 1981

SOURCE	Manpower						Total Operating ($) 1980/81	USES	Manpower						Total Operating ($) 1980/81
	RO	Manager	TO	Clerk	FA	GH			RO	Manager	TO	Clerk	FA	GH	
Northfield	3	1	4	1	1	11	62 399 (59 272)*	Nuriootpa	1.2	-	1	-	1	2	9 815 (9 815)
Kybybolite	3.6	1	2	1	3	3	45 338 (38 881)	Southern Hills	5	1	5	2	3	12	62 399 (59 272)
Struan	3	1	2	2	2	8	110 978 (86 197)	S.E.	6.6	1	4	2	5	11	156 316 (146 451)
Turretfield	7	1	5	2	1	7	61 835 (60 254)	North Adelaide Plains	6	1	5	2	1	7	61 835 (60 254)
Lenswood	2.2	1	1	-	1	8	38 582 (38 582)	Eyre	1	1	1	1	1	3	58 041 (52 882)
Parndana	1	1	1	1	2	3	37 775 (36 825)	Mt. Barker Office	1	-	-	-	-	-	
Minnipa	1	1	1	1	1	3	58 041 (52 882)								
TOTAL	20.8	7	16	9	11	43	414 948 (372 893)		20.8	4	16	7	11	35	348 406 (328 674)
Surplus staff and operating	0	3	0	1	0	8	66 542 (44 219)								

.. Overall there would be a saving of 3 Managers, 2 Clerks, and 8 General Hands and also $44 219 operating. These could be re-assigned to other centres, i.e.
1 Manager, Wanbi
2 GH to Loxton
2 GH to Nuriootpa
2 GH to Minnipa
1 GH to Cape Borda
1 GH to Wanbi
Exchange 2 Manager positions for TO's to be based at Minnipa

* State Fund Money Only in Brackets

TABLE 14

THE OVERALL EFFECT OF THE RELOCATION OF STAFF AND POSITIONS

Research Centre	RO	MANAGER	TO	CLERK	FA	GH
Southern Hills	5	1	5	2	3	12
Northfield Pig	2(3)*	1	1	-	-	3
Parafield Poultry	3	1	1	1	-	9
Parafield Plant	(0.1)	1	-	-	1	3
Cape Borda	(3)	1	-	-	-	1
Northern Adelaide Plains	6	1	5	2	1	7
Nuriootpa	3.2	1	1	1	1	9
Loxton	5(7)	1	3	1	4	11
Wanbi	(0.3)	1	0.5	1	-	3
Struan	6.6	1	4	2	5	11
Minnipa	0.7(0.3)	1	3	1	1	5
Total	31.5(10.7)	11	23.5	11	16	74

* The numbers in brackets indicate officers in contact but not necessarily working or based on the Centre.

9. OTHER ISSUES

RESEARCH CENTRE TRADING ACCOUNT

9.1 Many of the Industry and Departmental submissions suggested that research centres would be encouraged to be more efficient if the funds obtained from the produce sold from the centre were available for use by the centre. Under present arrangements, income from the produce is paid directly into the consolidated revenue account. The funds to run the research centres are provided through the revenue budget each year. The Livestock Trading Account that has been recently established, has increased the flexibility of management of the centres by allowing them to purchase and sell livestock as required. At the end of each financial year the funds in excess of the original $35,000 float are paid into consolidated revenue.

9.2 The research centres, under the present treasury allowance of only 4% for inflation, are finding it difficult to operate as the cost of fertilizer, seed, electricity, rates, animal requisites, fencing, maintenance of equipment and watering facilities are escalating at a higher rate. To be able to maintain the minimum farm operation (expenditure A) without having to reduce the maintenance of equipment, the maintenance of capital improvements or fertilizer applications to research centre properties, a more flexible system is needed.

9.3 The review of the financial structure of the research centres in Chapter 4 indicated that the income (I), which includes both the income which is paid into the consolidated revenue account and the value of produce transferred to other research centres, almost supports the basic farm (expenditure A + D - I). The sale of Lenswood Research Centre and the relocation of Northfield Dairy Research Centre should make the basic operation of research centres profitable (expenditure A + D - I). The information provided for this report, however, reflects only one year of operation. In 1981/82 the Northfield Dairy Research Centre made a management decision to agist the dairy cows so that the feed could be used to rear 140 heifers in an approved research programme. While this centre made no significant income in that year the potential to earn income in the following years is high. In the 1983/84 year drought has affected all research centres and the nett income will be reduced. Consequently, limiting trading to a financial year basis will make it difficult to operate profitably through all years considering the high fixed costs associated with centres.

9.4 The variation in income (I) between the centres is high (Table 4). It is evident that some research centres would be "carrying" others and that these would be in different administrative units within SAGRIC. At present the Treasury Department offsets the gross cost of the operation of research centres (expenditure A) against the income (I) and the centres making a loss of $223,000 annually (expenditure A + D - I). A request for each research centre to indicate the new initiatives they could undertake to become more profitable showed that there were only minor gains to be made and many of these required an increase in capital investment. The Working Party is not confident that a nett profit (I - A) can be maintained to cover drought years, changes in research resource needs or downturns in the market price for rural products. The Working Party was aware that the Northfield Pig Research Unit was operating a Trading Account profitably. It was, however, trading in a lucrative commodity, was managed and maintained with State Funds, received grain at minimal cost from Minnipa Research Centre and received an annual grant from the Swine Compensation Fund.

9.5 The Working Party thought that the task of research centres was to conduct research and manage the resources at their disposal effectively and as profitably as possible subject to the constraint of the research programmes. Since the research centres would be barely profitable, to introduce a Research Centre Trading Account would create undue pressure to make the centres operate profitably at the expense of the research. Consequently the concept of a general Research Centre Trading Account was not supported. There are, however, opportunities on most research centres where small and profitable projects may be undertaken if funds are given to support them. A trading account, which would fund discrete projects on research centres, would increase the flexibility of management and increase the opportunities for managers to run centres more profitably.

Recommendation 17 That a trading account for discrete and profitable projects on research centres be investigated with the aim of making centres more commercially orientated but without prejudicing research requirements.

TITLES OF RESEARCH CENTRES

9.6 The Working Party considered the titles of research centres, which are at present designated by place names. Three systems were considered - using place names, using the major agroecosystem served by the centre or using the region in which the centre is located. It was agreed that the present policy of naming a centre according to its location was suitable. Naming the centre according to the agroecosystem served by the centre may make it difficult for the centre to change its emphasis as the agriculture in that area changes. Naming the centre according to region does not indicate the location of the centre or the industry served to interested interstate people.

Recommendation 18 That research centres be titled according to the nearest recognised town.

MANAGEMENT OF LEASE PROPERTIES

9.7 The Working Party noted that when a leased property was established as a research centre there was often an underestimation of the labour and resources required for research and to maintain the property in good order as set out in the lease. As research priorities change in the Regions/ Divisions, the demand for the resources of the established research centres may alter. To ensure that there is effective use of resources in research the Working Party considers that any leased properties should come under the control of the manager of the nearest research centre so that the manager may provide any available resources from the research centre.

Recommendation 19 That all leased properties be under the control of the manager of the nearest SAGRIC research centre.

APPENDIX I QUESTIONNAIRES FOR RESEARCH CENTRES

QUESTIONNAIRE NO. 1

FINANCIAL STRUCTURE AND RESOURCES OF EACH RESEARCH CENTRE

The following questionnaire has been designed to obtain a break-down of the manpower, finance and resources of each centre. The information required is for the 1980-81 financial year. Where information on staffing is required it should be taken as of June 30, 1981. If there are any problems in completing the questions, please contact Mr. R.B. Wickes, Acting Principal Officer, Research Management (227 3000). The completed questionnaires should be returned to Mr. Wickes by Friday, August 14, 1981.

QUESTIONS

1. Could you please list all the staff based on the centre on June 30, 1981. Please give name, classification, duties, source of funds. Please list where the work of these officers is carried out i.e. on the centre, off the centre, laboratory.

2. Could you please also list any staff which work on the centre but are not located there.

3. Could you please list for each centre the projects (as listed for project budgetting in SAGRIC), the objectives of each project, the staff in each project and the funds spent in 1980/81 on salaries, operating, travel and capital.

4. Could you please also list the projects based externally to the centre but which use a portion of the resources at each centre. What proportion of the resources (land, staff, equipment) do each of these projects use, i.e. resources, land and staff?

5. Please list the preschedules (code, title and research staff) that are (i) conducted on the centre and (ii) conducted off the centre. When is the experimental work in each experiment scheduled to finish using the physical resources of the centre?

6. Please break the costs of running the research centre into (i) the costs of owning the property; (ii) the costs associated with running a farm operation; (iii) the overhead costs associated with having research conducted on the property and (iv) the costs of the actual research projects which are based on the centre.

   The aim of this question is to be able to determine what are the fixed costs and farming costs on each property compared with the costs of conducting a research or service function. Attached is an example which has been derived from the Northfield Research Centre. Please develop the forms (1 to 6) for your research centre for 1980/81 using the following guidelines.

Form 1 - The Cost of Maintaining the Land

In this form please include any costs such as rates and taxes and rent.

Form 2 - Basic Operating Required to Run a Farm

and

Form 3 - Overheads on the Centre to Support Research and Service Projects

To be able to complete these forms some subjective decisions will have to be made in allotting expenditure between Form 2 and Form 3. You will note on the example given that the State funded projects listed appear on both forms and that decisions on the amount of staff and operating costs that can be contributed to the farm compared with research and service have been made. Examples are for fencing where $585 has been spent on materials to maintain the existing fencing whereas $267 has been spent on building new yards to hold experimental animals. The feed purchased has been divided between that used on the milking herd and that bought in to provide experimental diets for groups of heifers not normally carried on the property.

Please note also that the transfer of produce from other centres has been included under IV and the value of that produce added to the running of the centre.

Form 4 - Funds Used Directly on Research and Service Projects

This is a list of all funds used to support research programmes on the centre from both state and Rural Industry Research Trust Fund sources. Please note that each Rural Industry Research Trust Fund has a State Funded component. In the example given this component is for the salaries of the supervisor of the project.

Form 5 - Income and Expenditure of Produce

On this form the actual income of the centre plus that foregone due to the transfer of goods either for research purposes e.g. use of whole milk or to other centres e.g. grain from Minnipa has been included.

Form 6 - Summary of Research Centre Finance

This form is a collation of material from the other forms.

7. Please list the research and farm equipment on the centre which has an estimated clearing sale value of over $500. Please indicate the estimated clearing sale value.

8. Please indicate the estimated value of the land ($/hectare) of the research centre using recent property sales in the area as a guide. Please list the buildings and improvements (silos, hay sheds) on the centre with an approximate value for each. The intention of this question is to be able to obtain an estimate of the capital investment in each research centre.

EXAMPLE ONLY

(Only 11 months operation of Northfield Research Centre)

OPERATING FOR NORTHFIELD RESEARCH CENTRE 1980/81

FORM 1 The Cost of Maintaining the Land

OBJECT		PROJECTS			
		NRC PROPERTY 80BP	NRC HOUSING 80BQ	NRC OPERATIONS 2XAP	TOTAL
Rates and Taxes	CP	6 313	1 800	66	8 179
Rent	CQ				
Total ($)		6 313	1 800	66	
Grand Total ($)					8 179

EXAMPLE ONLY

(Only 11 months operation of Northfield Research Centre)

OPERATING OF NORTHFIELD RESEARCH CENTRE 1980/81

FORM 2 Basic Operating Required to Run a Farm

OBJECT		PROJECTS		
		NRC PROPERTY 2XAP	PID AND AID ELECT 80KW	TOTAL ($)
I. STAFF: ($)				
Salaries	AA	17 000		
(Manager)	AB			
Wages: AC + AD + AF + AG		26 590		
	AE	9 020		
(3 Dairy Hands 2 General Hands)				
Sub Total ($)		52 610		52 610
II. MAINTENANCE:				
Consumerable Supplies	BF	2 118		
Electricity	BK		1 589	
Feed	BM	1 037		
Freight	BP	496		
Fire Prevention	BQ	324		
Insurance of Crop	BT	221		
Maintenance Buildings	BV	187		
Maintenance Fences	BW		585	
Maintenance Plant	BX	4 000		
Minor Equipment	BZ	427		
Professional Service	CF	214		
Protective Clothing	CG	325		
Super Petrol	CH	296		
Standard Petrol	CJ	54		
Distillate	CK	1 376		
Lubricants	CL	40		
Tyres & Tubes	CM	10		
Seeds & Fertilizers	CR	4 233		
Safety Requirements	CS	46		
Travel-Motor	SZ	1 000		
Sub Total ($)		16 404	2 174	18 578
III. CAPITAL	BG	11 623		11 623
IV. VALUE OF GOODS TRANSFERRED (Grain from Minnipa)				3 730
TOTAL ($)		64 233	2 174	
GRAND TOTAL ($)				86 541

EXAMPLE ONLY

(Only 11 months operation of Northfield Research Centre)

OPERATING OF NORTHFIELD RESEARCH CENTRE 1980/81

FORM 3 Overheads on Centre to Support Research and Service Projects

OBJECT		PROJECTS					
		NRC PROPERTY 80BP	NRC OPERATIONS 2XAP	NRC ADMIN 80BN	PID AND AID ELECT. 80KW	NRC FIELD SUPPORT 2XAQ	TOTAL ($)
I. STAFF: Salaries	AA AB		11 000	9 818		2 593	
(Project Officer, Clerk)							
Wages: AC + AD + AF + AG	AE		70 908				
(8 General Hands)			10 000				
Sub-Total ($)			91 908	9 818		2 593	104 319
II. MAINTENANCE:							
Cleaning Expenses	BE	1 481	1 020				
Consumerable Supplies	BF	507	200				
Electricity	BK				2 489		
Feed	BM		3 023				
Films	BN		12				
Freight	BP		100				
Gas	BS		38				
Maintenance-Buildings	BV	2 494					
Maintenance-Fences	BW	267					
Maintenance-Plant	BX	943	476	36			
Minor Equipment	BZ						
Protective Clothing	CG		687				
Distillate	CK		300				
Safety Requirements	CS		46				
Stationary	CV		43				
Telephones	CX + CY		103	390			
Fees	DF		115				
Printing	SE		13	17			
Photocopying	SF		1	91			
Stationary	SG		286	159			
Photographic	SP		3				
Travel-Motor	SZ		3 174				
Travel-Accom.	TB		11				
Sub Total ($)		5 692	9 651	10 511	2 489		28 343
III. CAPITAL		-	-	-	-	-	-
IV. VALUE OF GOODS TRANSFERRED (Grain from Minnipa)							3 000
Total ($)		5 692	101 559	20 329	2 489	2 593	
Grand Total ($)							135 662

EXAMPLE ONLY

(Only 11 months of operation of Northfield Research Centre)

OPERATING OF NORTHFIELD RESEARCH CENTRE 1980/81

FORM 4 Funds Used Directly on Research Projects and Service Projects

PROJECTS		SALARIES & WAGES	MAINTENANCE	TRAVEL	CAPITAL	STATE TOTAL ($)	TRUST TOTAL ($)
NRC Operations	2XAP		289			289	
I.D. Research Management	2RAX		221			221	
Dairy Cattle Nutr.	2DAM	3 407	938			4 345	
Fodder Consv.	2HAA	5 391	315			5 706	
Fodder Analy. Serv.	2HAB	19 308	771			20 079	
Heifer Growth State		11 181				11 181	
Dairy Res. Com.	2D09		2 260		425		2 685
Field Dry Hay State		9 640				9 640	
Dairy Res. Com.	2D10		2 820	415			3 325
Husb. Invest. State		2 199				2 199	
CESC	2D17	29 977	3 434	487	5 110		39 008
Fodder Utiliz. State		2 199				2 199	
CESG	2H18	33 914	1 411	58	7 722		43 905
Total ($)		117 216	12 459	960	13 257	55 859	88 923
Grand Total ($)							144 782

EXAMPLE ONLY

(Only 11 months of Operation)

INCOME FOR NORTHFIELD RESEARCH CENTRE (1980/81)

FORM 5 Income and Expenditure of Produce

OBJECT	ACTUAL INCOME ($)	INCOME FOREGONE ($) (i.e. Grain transfer, milk consumed in research etc.).	PURCHASE OF LIVESTOCK ($)	TOTAL ($) (INCOME - EXPENDITURE)
Milk	38 390	7 850		46 240
Wool, skins	273			273
Livestock (Cattle)	13 187		3 284	9 903
Total ($)	51 850	7 850	3 284	
Grand Total ($)				56 416

EXAMPLE ONLY

(Only 11 months of Operation of Northfield Research Centre)

OPERATING OF NORTHFIELD RESEARCH CENTRE 1980/81

FORM 6 Summary of Research Centre Finance

		SALARIES	OPERATING & TRAVEL	CAPITAL	VALUE OF GOODS TRANSFERRED	TOTAL $
1.	Cost of Maintaining the Land.		7 179			7 179
2.	Basic Operating of Farm.	52 610	18 569	11 623	3 730	86 532
3.	Overheads on Centre to Support Research and service projects.	104 319	28 343		3 000	135 662
4.	Funds Used Directly to Fund Research and service projects.	117 216	13 419	13 257		143 892
Total		274 145	67 510	24 880	6 730	373 265

II. INCOME

ACTUAL INCOME	INCOME FOREGONE	EXPENDITURE	TOTAL
51 850	7 850	3 284	56 416

REVIEW OF RESEARCH CENTRES

Questionnaire 2

Review of Activities on Each Research Centre

The following is a list of questions which relate to the terms of reference given to the Working Party. It would be appreciated if these could be answered for each research centre and the replies returned to Mr. R.B. Wickes, Acting Principal Officer, Research Management by Friday, August 18, 1981. If you require any assistance in interpretation or in answering the questions, could you please contact Mr. Wickes (227 3000).

It is requested that each question be answered and in the order they have been set out to simplify the collation of the replies.

I. TERMS OF REFERENCE I - "Review the need for, effectiveness of and efficiency of operation of research centres currently run by the Department of Agriculture".

Could you please answer the following questions which relate to Terms of Reference I for your Research Centre.

1. Need for the Research Centre

(a) What agricultural industries, environment (soil type, climate) and expertise does the research centre cover for South Australia.

(b) What would be the effect of discontinuing the current lines of research on your centre?

(c) Is there any overlap with another South Australian centre in terms of research or service work and/or agricultural environment (soil type, climate)?

(d) What interstate research centres conduct similar research and service work as your centre? Does the type of work conducted on these centres differ from that carried out at your centre?

(e) What other roles does the centre have and what resources are committed to these (e.g. supplying grain, maintaining off centre research programmes)?

2. Effectiveness of Research

(a) What technology developed on the centre in the last 10 years has been adopted by S.A. agriculture?

(b) What is the average number of visits and type of visitors (Bureau Groups, Education Groups, individual farmers) that come to the centre each year seeking information.

(c) How much extension work is carried out by the Research Officers as a result of research carried ut on the centre? Please quanitfy this into Bureau meetings, conference and field days at which addresses have been given each year.

(d) Please list the publications produced as externally referred papers, those as short communications and those as technical bulletins and fact sheets that have been produced over the past 5 years from the research conducted on the centre.

3. Efficiency of Operation

(a) What management procedures are implemented to monitor research progress on the centre?

(b) What is the area of the research centre and what propotion of this land is used for:

(i) Research?

(ii) Service (e.g. vine improvements programme, random sample laying test)?

(iii) Other purposes?

(c) What proportion of the livestock are used for:-

(i) Research?

(ii) Other Purposes?

II. TERMS OF REFERENCE 2 - "Advise on the cost-effectiveness and scientific merit of using research centres compared to other sites for the conduct of scientific investigation".

Could you please answer the following questions that relate to the Terms of Reference 2.

1. To what extent could the current research programme or parts of that programme be carried out on private or leases properties if there were adequate financial arrangements?

2. What would be the advantage in using private or leased properties?

III. TERMS OF REFERENCE 4 - "In the context of projections for the future of S.A. Agriculture, recommend on the future need for, operation of and location of research centres to serve South Australian agriculture in the next 20 years".

Could you please answer the following questions that relate to the Term of Reference 4.

1. Is the research centre located in the best position for conducting the research and service functions that are currently being undertaken?

2. What change in emphasis of the present research programme that is being conducted on the centre would you recommend?

3. What research is carried out that could be more effectively conducted on another centre?

4. What shortcomings in staff, buildings, equipment, fencing, stock plantings etc., are there which are inhibiting an effective research programme? (Please list any shortcomings in order of priority).

IV TERMS OF REFRENCE 3 - "Examine the potential value for research or other purposes of land bequested to the Department of Agriculture at Cleve and Saddleworth".

Could the Regions which control Sims Farm and Winkler Estate please provide answers on the following questions:

1. What are the present uses and available resources on each centre?

2. Is there any research activities to which these areas of land are especially suited that cannot be conducted on the present research centres of the Department.?

3. What sort of research activities could be developed on these properties and what would be the resources, capital and operating costs necessary to achieve this?

4. What alternative uses could be made of them other than using them as research centres?

APPENDIX II DEPARTMENTAL AND INDUSTRY SUBMISSIONS

The following individuals and groups provided written submission to the Working Party. The Working Party found the opinions expressed of great assistance and would likely to sincerely thank those who went to the effort of making a contribution.

Industry Submissions

1) Mr. K. Williams, Chairman, South East Research and Extension Liaison Committee

2) Mr. B.G. Schinckel, "Mullana" Kybybolite S.A.

3) Mr. D.M. Cain, Secretry, The Citrus Organization Committee of South Australia. Finniss Street, North Adelaide. S.A.

4) Mr. B.D. Banbury, Secretary, Australian Barley Board, South Terrace, S.A.

5) Mr. R.T. Reed, General Manager, S.A. Fruitgrowers' and Market Gardeners' Association Inc. Rundle Street, Adelaide. S.A.

6) Mr. W.N. Bishop, Fruit S.A. Fruitgrowers' and Market Gardeners' Association Inc. Rundle Street, Adelaide, S.A.

7) Mr. D.E. Grivell, Market Gardens, S.A. Fruitgrower's and Market Gardeners' Association Inc. Rundle Street, Adelaide, S.A.

8) Mr. N.R. Seppelt, Technical Manager, B. Seppelt and Sons. Ltd., Flinders Street, Adelaide. S.A.

9) Mr. T.C. Somers, Acting Officer in Charge, The Australian Wine Research Institute, Urrbrae, S.A.

10) Mr. D.J. Cameron, Secretary, The Phylloxera Board of South Australia. Grenfell Street, Adelaide. S.A.

11) Mr. S.A. Fulton, S.A. Advisory Board of Agriculture, Grenfell Street, Adelaide. S.A.

12) Mr. R.J. Rofe, General Secretary, Murray Citrus Growers' Co-op. Association (Australia) Ltd. Berri, S.A.

13) Mr. A.D. Preece, President, Wine Grapegrowers' Council of South Australia Inc, South Terrace, Adelaide. S.A.

14) Mr. M.N. Birse, Combined Potato Industry and Market Gardeners' Association Inc. Rundle Street, Adelaide. S.A.

15) Mr. G.E. Andrews, General Secretary, United Farmers and Stockowners of S.A. Inc. South Terrace, Adelaide. S.A.

16) Mr. D. Edson, Dairy Section, United Farmers and Stockowners of S.A. Inc. South Tce, Adelaide. S.A.

17) Kangaroo Island Agricultural Council, Parndana S.A.

18) Mr. B. Lockier, Manager, Apple and Pear Growers Association of S.A. Inc. Norwood, S.A.

19) Mr. R.L. Younger, Secretary, Loxton Co-operative Winery and Distillery Ltd. Loxton S.A.

20) Mr. B.G. Stephens, Manager, Wine and Brandy Producers' Ass. of S.A. Inc. Greenhill Road, Wayville. S.A.

21) Mr. N.E. Nietschke, Secretary, Buchanan Branch of S.A. Agricultural Bureau Eudunda. S.A.

22) Mr. R. Bartsch, Secretary, Barossa Wine Grape Advisory Council.

23) Mr. K. Dobson, Secretary, Pig Liaison Committee, Northfield S.A.

24) Mr. B. Daniel, Agricultural Senior, Cleve Area School, Cleve, S.A.

Agricultural Organisations

1) Mr. M.B. Spurling, Acting Director, Roseworthy Agricultural College, Roseworthy. S.A.

2) Mr. E.N. Fitzpatrick, Director of Agriculture, W.A. Department of Agriculture, Perth. W.A.

3) Dr. D.E. Smith, Director-General of Agriculture, Department of Agriculture Melbourne, Victoria.

4) Dr. G.I. Alexander, Director-General, Department of Primary Industries, Brisbane, Queensland.

5) Mr. C.H. Gurd, Secretary, Department of Primary Production, Darwin, N.T.

6) Dr. P.J. Fountain, Director of Agriculture, Hobart, Tasmania.

7) Dr. J.W. McLaughlin, Assistant Director-General, Victorian Department of Agriculture, Melbourne, Vic.

8) Dr. N.K. Boardman, Member of Executive, CSIRO. Canberra. A.C.T.

S.A. Department of Agriculture Submissions

1) Mr. P. Madge, Senior Entomologist; Northfield Research Laboratories S.A.

2) Mr. A.F. Tideman, Chief, Plant Industry Division, Grenfell Centre, S.A.

3) Mr. W.A. Michelmore, Senior District Agronomist; Nuriootpa, S.A.

4) Mr. E.A. Dunstan, Senior Research Officer, Kybybolite, S.A.

5) Mr. T.H. Brown, Senior Research Officer, Kybybolite, S.A.

6) Mr. A.D. Craig, Research Officer, Kybybolite, S.A.

7) Mr. A.R. Heard, Research Officer, Kybybolite, S.A.

8) Mr. A. Morris, Manager, Kybybolite, S.A.

9) Mr. R.W. Powell, District Animal Health Adviser, Murray Bridge, S.A.

10) Mr. R.T.J. Webber, Chief Regional officer, (Central); Adelaide. S.A.

11) Dr. P.S. Cocks, Regional Officer; Adelaide, S.A.

12) Mr. B. Tugwell, Senior Research officer, (Fruit Storage), Northfield S.A.

13) Mr. P.T. Gallasch, Senior Research Officer, (Citrus), Loxton. S.A.

14) Mr. B.G. Lay, Senior Ecologist (Arid Lands), Adelaide, S.A.

15) Mr. K. Wetherby, Senior Soils Officer, Cleve, S.A.

16) Mr. G.R. MacPhie, Senior Soils Officer, Cleve, S.A.

17) Mr. T.M. Yeatman, District Agronomist, Cleve, S.A.

18) Mr. M.J. Catt, Regional Research officer, Port Lincoln, S.A.

19) Mr. R.D. Henderson, Vegetable Adviser, Loxton, S.A.

20) Mr. W.A. Hawthorne, Senior Research Officer, (Crop Agronomy) Struan, S.A.

21) Mr. D. Phillips, Livestock Research Officer, Struan, S.A.

22) Mr. M.P.B. Deland, Senior Research Officer, Struan, S.A.

23) Mr. M.A. Liebelt, Convenor, Dairy Production Group, Northfield, S.A.

24) Dr. G.R. Stirling, Senior Research Officer (Nematology), Loxton, S.A.

25) Mr. G.N. Thomas, Chief Regional Officer (Murraylands), Loxton. S.A.

26) Mr. I.P. Bond, Manager, Loxton Research Centre, Loxton. S.A.

27) Mr. J.T. Feagan, Chief, Animal Industry Division, Adelaide. S.A.

28) Mr. R.C. Mugford, Livestock Officer Mount Gambier, S.A.

29) Mr. R.J. French, Chief, Land Use and Protection Division, Adelaide, S.A.

30) Mr. M.R. Till, Principal Soils Officer (Irrigation) Adelaide, S.A.

31) Mr. B.J.R. Handscombe, Senior District Officer, Mount Gambier, S.A.