Setting Priorities for Research Purposes and Research Projects

A Case Study Involving the CSIRO Division of Animal Health

Corporate Planning Office

Preface

This document presents a report on the research priorities exercise undertaken by the CSIRO Division of Animal Health in the latter part of 1992. A major component of this exercise was the priorities workshop conducted in October 1992.

The success of the exercise rested largely on the enthusiasm and commitment of the Division Chief, Dr Mike Rickard and his colleagues on the management team. Ken Barker carried the burden of coordination and logistics which he performed in a particularly effective fashion. The preliminary and main priorities workshops were facilitated by Ralph Young of the CSIRO Corporate Planning Office.

The Division of Animal Health case study represents an important milestone in the evolution of the research priorities process in CSIRO because of its contribution to best practice, particularly in relation to project priority setting.

This report was prepared by Ralph Young and benefited from valuable input from Mike Rickard.

Don MacRae
CSIRO Corporate Planner
26 November 1993

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Introduction

The mission of the CSIRO Division of Animal Health is to discover and develop methods and products for the diagnosis, control or eradication of the major endemic diseases of farm livestock in temperate Australia, to improve the quality and marketability of livestock products and to enhance Australia's capability and preparedness to combat exotic disease outbreaks in livestock.

To assist in the achievement of this mission, the Division developed a Strategic Plan for the period 1992/93 to 1995/96, and in a complementary exercise, completed an assessment of project priorities.

The purpose of this report is to describe the process by which these outcomes – the Strategic Plan and a set of project priorities – were accomplished.

The priorities process began with a preliminary workshop in July 1992. This was followed by a period of preparing supporting data and information leading up to the main priorities workshop in October 1992. The post workshop phase included finalisation of Role Statements for each of the Division's research purposes and the completion of the Divisional Strategic Plan.

The Preliminary Workshop

The key objectives of the preliminary workshop were to agree on the objectives of the priorities exercise, review and agree on the priorities process to be employed in the determination of the Division's strategic research and project priorities, and, in particular, to focus on the identification of the Division's research purposes. Because the latter would determine the type of data and other supporting information to be used by participants in the priorities scoring exercise, it was important to resolve this question well in advance of the main workshop.

The participants at the preliminary workshop were the members of the Divisional Management Team (Chief, Deputy Chief, Assistant Chief, Program Managers and the Business Manager). These individuals would be responsible for implementing the outcomes of the priorities process and their active support for and ownership of the outcomes would be a precondition for the success of the exercise.

A background document setting out the different stages and steps in the determination of the Division's strategic research and project priorities and containing a discussion of a number of selected issues relating to definitions and process was circulated at the preliminary workshop (see Annex A). This document formed a basis for reviewing the priorities process which was adopted.

Box 1. Process for Scoring Research Purposes Against the Four Criteria

Steps

1. Take one criterion at a time and for that criterion, assign scores as follows:
2. From the list of research purposes (areas of research opportunity) identify the one (or more) which merit the highest score against the criterion being considered and assign a score of 10 to that research purpose.
3. Select the one (or more) research purpose(s) which are to receive the lowest score, and assign a score of 1.
4. Rank remaining research purposes between the two high/low scores and assign scores reflecting relative ranking.
5. Repeat steps 2 to 4 for next criterion; and complete the exercise for all four criteria.

Points

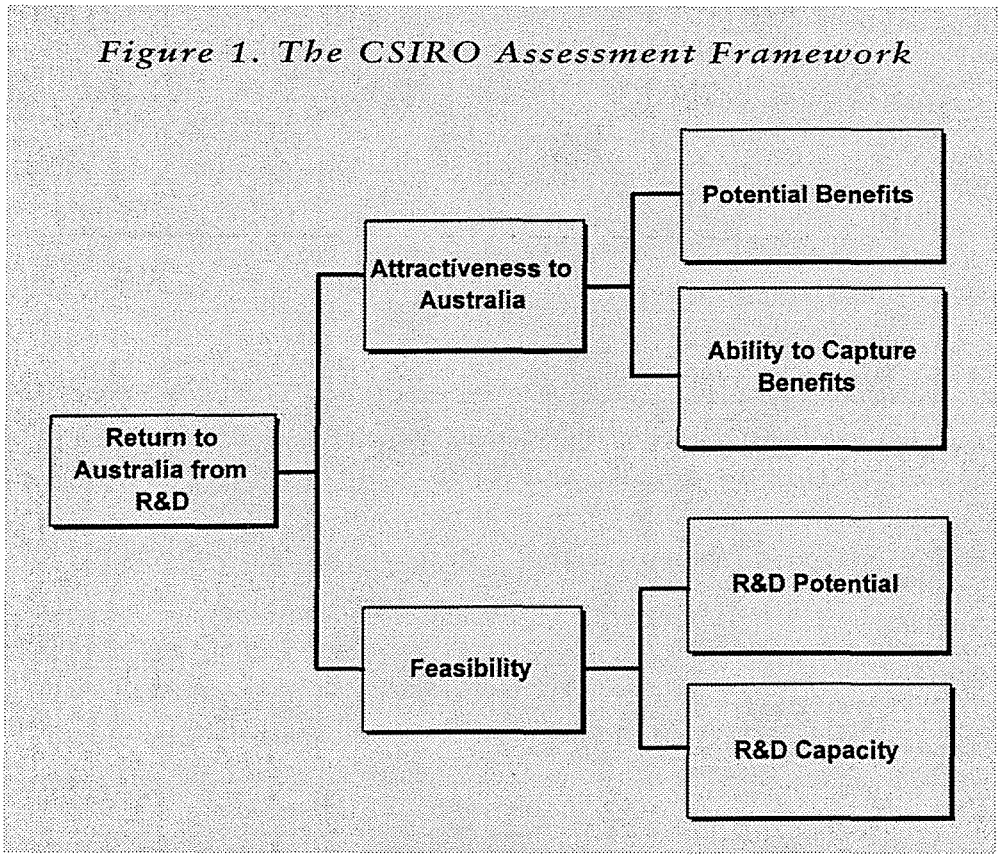
- 10 Represents the highest score; and 1 the lowest score;
- The scores are relative rather than absolute and hence it is unnecessary to agonise over whether a particular research purpose should get say a score of 4 or 5 – the key is its relativity to the other research purposes in terms of the particular criterion being addressed.
- Reference should be made to the supporting data and information in the data and evaluation sheets to assess each research purpose.
- Reference should be made to the definitions of the criteria and associated discriminant questions (see Attachment 4 in Annex A) before scoring.

The interactive discussion at the preliminary workshop was very positive and constructive. In addition to reaching agreement on the assessment framework (Figure 1), the criteria for assessing research purposes (Annex B), and the process for scoring each research purpose against each of the criteria (Box 1), the following topics were considered:

Objectives of the Exercise: it was agreed that there were two main objectives:

- to determine research purpose priorities, and on that basis to produce Role Statements for each research purpose which would form the foundation of the Division's new strategic plan.

Figure 1. The CSIRO Assessment Framework



- to determine project priorities across the existing portfolio of projects, and on that basis to generate a project priorities screen which would facilitate resource allocation decisions.

Research Purposes: In the discussion of this issue, it was noted that it is important to distinguish between the problem area and the tools or technology used to address the problem. Vaccines, for instance, represent an important area of research for the Division, but in essence these are a tool or technology rather than the problem area being addressed e.g. disease control. They are also project oriented and will be assessed in the project priorities assessment. For research purposes, ideally what are wanted are user or client oriented areas of research opportunity which are mutually exclusive so that double counting in the scoring of the criteria is avoided.

Two of the Program Managers volunteered to generate a list of research purposes based on livestock industries and a list of research problem/issue areas. These would represent alternative orientations of the areas of research opportunity facing the Division over the next five years and would permit a matrix analysis by the members of the Management Team of the relative importance of these opportunities as well as providing a basis for identifying a set of research purposes for assessing the Division's strategic research priorities.

It was further noted that it was probably preferable to select one or other of the axes of the matrix rather than a range of cells in the matrix when identifying research purposes. The value of the matrix analysis will be to clearly define what the important components of each research purpose are, so that an industry research purpose will be defined in terms of a number of key problem areas, or conversely, a problem area will be defined in terms of one or more key industries. A cell based research purpose would be defined in terms of two dimensions i.e. industry and problem area(s), whereas the other two options are defined in terms of a single dimension.

Following the preliminary workshop, a research purpose matrix was developed with industry based research purposes along one axis and problem/issue based research purposes along the other (see Annex B). The members of the Management Team then assessed each cell by assigning a high/medium/low/zero ranking to represent the importance of each as an area of research opportunity.

As a result of the matrix analysis, a decision was made to adopt the industry based set of research purposes. An influential factor contributing to that decision was the fact that the relatively small number of problem area categories would not allow such a fine discrimination in guiding meaningful priority setting and resource allocation as the larger number of industry based research purposes.

Data and Evaluation Sheets: It was agreed that data and evaluation sheets for each research purpose would as far as possible be based on those used for the parent Institute priorities exercise which had been conducted shortly before the preliminary workshop. Although the Institute information was more aggregated than was wanted at the Division level, it was fairly easy to disaggregate it to achieve the degree of relevance required.

External Participation in the Priorities Workshop: It was agreed that external stakeholder representatives should participate in the scoring of research purposes. The assessment of project priorities would however remain the responsibility of the Management Team and external participation would be limited to the strategic assessment of research purposes.

Project Priorities: It was agreed that the list of criteria shown in Annex F, which are based on the list of criteria developed earlier in the year by the Division of Soils for a similar exercise, would be used in the assessment of the Division's project priorities. Project data to support the assessment would be taken from the RESEARCH data base.

Preparation

In the lead up to the main workshop, the major preparatory activity was the compilation of information and data for each research purpose to enable participants to make assessments based, as far as possible, on objective information.

The resulting compendium of supporting information included the following items:

- Data and Evaluation Sheets for each research purpose (Annex C)
- Advice on scoring; priorities criteria and a scoring sheet (Annex E)
- Draft Strategic Plan for the Institute of Animal Production and Processing (IAPP)
- Report of the Evaluation of the Division by the Institute (IAPP) in August 1992
- Macro-economic information and data presented at the 1992 National Agricultural and Resources Outlook Conference by the Australian Bureau of Agricultural and Resource Economics (ABARE)
- Commodity projections to 1996/97 by ABARE (see Annex D)
- Supplementary information for each research purpose e.g. from the Outlook Conference; Bureau of Rural Science etc.
- Project Scoring Sheet (Annex F)
- Information on each project being assessed from the RESEARCH data base, including objective, strategy, planned outcomes for research, technology transfer, funding and other key performance areas, cost/benefit estimates and resources data, including sponsorship and collaboration.

The nominated champion(s) for each research purpose, drawn from the Management Team and external participants, were assigned the task of filling any gaps in the data and evaluation sheets.

Responsibility for logistics, for coordinating the information and data inputs, and for producing the compendium rested with the Divisional Secretary. It is a tribute to his organising skills that the pre-workshop phase went so smoothly.

The final tasks before the main workshop were the preliminary scoring of each research purpose by the members of the Management Team and external participants "out of session", the processing of these scores, and the circulation of these to each participant.

The Workshop

The workshop was held over two days in mid October 1992. The first day was devoted to setting research area priorities, and the second to setting project priorities (see Annex G). The participants comprised the Divisional Management Team plus four external stakeholder representatives from the Division's Planning and Advisory Committee representing the pharmaceutical industries, farming, a state department of agriculture and academia respectively.

The first session of the first day began with a review of the objectives for the day:

- discuss and revise preliminary scores
- agree on scores and screens
- agree on research purpose priorities
- draft Role Statements
- discuss preparation of Strategic Plan

This was followed by consideration of the steps to be taken to achieve the objectives and the outcomes. To ensure that each participant was clear on the components of the framework, the set of research purposes, the criteria and the scoring process were also reviewed.

Reviewing Priority Scores

The main task of the morning session was to review the preliminary scores made by each participant prior to the workshop. A key aim of the review process is to share information among the participants, but it soon became apparent in the discussion that an equally important aspect was the sharing of different perspectives and interpretations of essentially the same data base. In this context, the value of involving external participants soon became apparent. Their contributions to the discussion were typically thoughtful and insightful and provided additional perspectives on the research purposes for consideration by the group.

A further key aim was to allow participants to revise their scores in the light of the information thrown up by the discussion. The procedural cycle characterising this rescoring process consisted of the following steps:

- Review scores for first criterion, and focus on the set of participants' scores for each SEO in turn
- For each SEO:
  – brief presentation addressing the criterion in question by the nominated "champion"
  – participants responsible for "outlier" scores (scores 2 or more points from group average) explain reasons for their higher or lower scores
- Move to next criterion and repeat process for each SEO in turn.

It was important to keep the discussion focused on the issues in question because with forty sets of scores to be covered (10 SEO; by 4 criteria) in discussion involving a group of thirteen participants, time could easily run away. Fortunately, in the case of the Division of Animal Health, the workshop participants interacted well together, and were also well focused in their discussion.

Results of Research Priorities Assessment

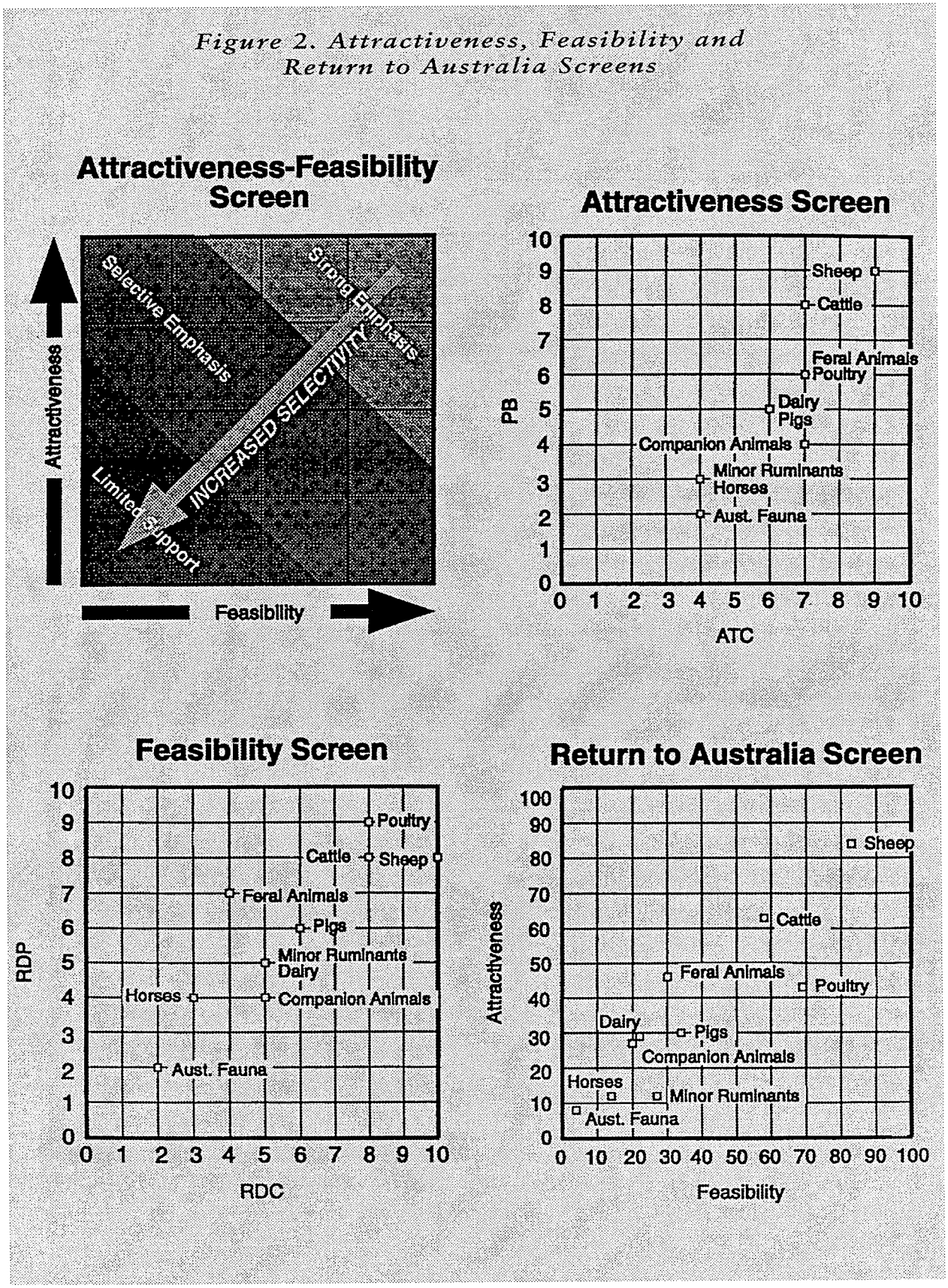
Once the review of preliminary scores was completed, the revised scores were processed and the group average scores and associated screens were presented to the group of participants for endorsement and interpretation.

The set of screens (Attractiveness, Feasibility and Return to Australia) and a guide to their interpretation are shown in Figure 2. The Return to Australia screen summarises the complete set of scores across the four criteria. It is clear that the research purpose for sheep was assessed as having the highest ranking or priority of the ten SEO based research purposes, and was some way ahead of the second ranked research purpose, cattle. In addition, there was a group of five research purposes (Dairy, Companion Animals, Minor Ruminants, Horses and Australian Fauna) which were clustered in the lower left hand corner of the screen. These seemed to be of relatively lower priority, which suggested that the level of support for these research areas should be limited.

Occupying the "middle ground" were three research purposes, (Poultry, Feral Animals and Pigs) and their juxtaposition in the Return to Australia screen presented a potentially interesting support problem. Both poultry and feral animals were assessed as being approximately equally attractive, and this is confirmed from a glance at the Attractiveness screen which shows an essentially identical assessment for each in terms of the Potential Benefits and Ability to Capture criteria. Pigs, on the other hand, are assessed as representing a less attractive research opportunity than the other two in this middle group.

When Feasibility is considered, poultry receives the second highest ranking of the ten research purposes with pigs and feral animals some way behind. It can be seen that the difference in Feasibility ranking between the equally attractive poultry and feral animals research purposes is due partly to their different levels of R&D Capacity and, in part, to differing R&D Potential assessments, with poultry being assigned the highest R&D Potential score of the ten research purposes. To the extent that the priority difference between the two is attributable to R&D Capacity, then it may be concluded that a further assessment may be desirable of the potential for shifting the feral animals research purpose closer to the top right hand area of the Return to Australia Screen by increasing R&D Capacity via collaboration for example. Conversely, the location of poultry on the Return to Australia relative to other research

Figure 2. Attractiveness, Feasibility and Return to Australia Screens



purposes with a higher or the same Attractiveness score (cattle and feral animals) might raise the question of whether poultry is over-resourced relative to these other research purposes. The analysis of such a question might, for example, lead to the conclusion that greater reliance on external funding for poultry research may be appropriate.

The foregoing points are made for the purpose of illustrating the type of interpretation issues which can arise in relation to the Return to Australia Screen, and these, in turn, point to the need for a second look at the supporting information and data including the Attractiveness and Feasibility screens before such issues can be resolved, and particularly before resource allocation decisions are made.

Once the group had endorsed the group scores and screens as representing the judgement of the group, consideration was given to the drafting of Role Statements for each research purpose. Following agreement on the format and content of the Role Statements, the nominated champions for each SEO prepared an initial draft Role Statement for consideration by the other members of the group, and out-of-session development and refinement. Time constraints prevented more substantial progress, and the arrangements for the preparation of a new Divisional Strategic Plan were left as a task for the Management Team at a subsequent date.

The substantial progress which was achieved in the face of an intense and challenging agenda bears testimony to the enthusiasm and commitment of the group of participants in pursuing the agreed objectives. The success of the endeavour meant that foundation for the new strategic plan was largely in place by the end of the first day.

Reviewing Project Scores

The assessment of project priorities commenced on the second day of the workshop with participation being restricted to members of the Management Team, as indicated above. Preliminary scoring of projects had been completed on an individual basis before the workshop. The first session again began with consideration of objectives, outcomes and process steps before reviewing and discussing the preliminary project scores.

The scoring procedure for the assessment of the 28 projects which made up the Division's portfolio of current projects was very similar to that for the assessment of research purposes, with the exception that nine criteria rather than four were employed in the assessment (see Annex F), and the scores were in the range 1-5 rather than 1-10. The process of reviewing and revising scores was also very similar to that for research purposes.

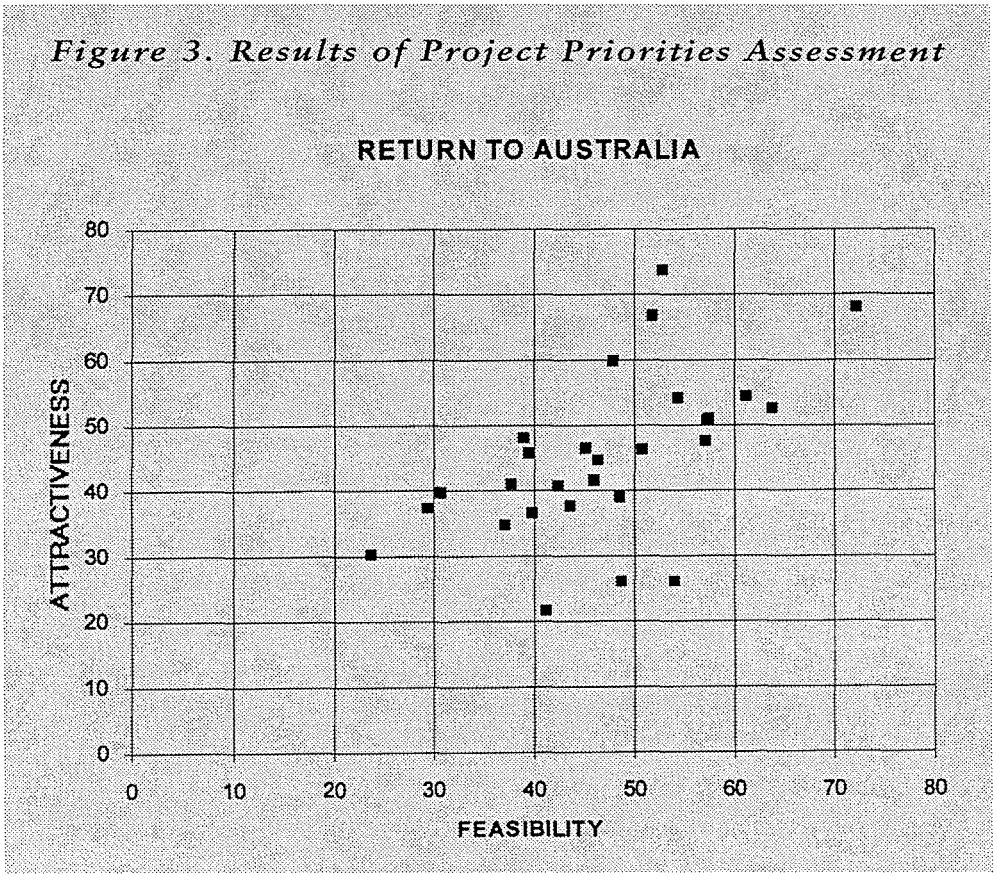
The larger number of criteria and projects to be assessed compared with the assessment of research purposes the previous day implies a more time consuming exercise, and it was to the credit of the Management Team that their commitment and discipline in applying the process ensured that the project priorities exercise was completed within the allotted time.

Results of Project Appraisal

An innovative step was introduced into the processing and analysis of project scores, by assigning weights to the project quality criteria. It was also decided to combine criterion 4 (Client Interaction) with criterion 5 (Communication) because these were perceived to be closely related. These steps enabled the computation of a weighted average score for each project which then formed a basis for ranking projects and identifying their relative priority.

A second innovative development to the assessment of project priorities was introduced to the analysis of project scores by grouping eight of the nine criteria, into the four criteria used to assess research purposes. The groupings of the quality criteria into attractiveness-feasibility criteria are shown under the list of criteria in the project quality scoring sheet (Annex F).

Figure 3. Results of Project Priorities Assessment



By classifying the scores according to the grouped quality criteria, an attractiveness-feasibility screen for projects could be generated similar to that for research purposes. The resulting Return to Australia screen for the set of Divisional projects is shown in Figure 3. Not only did such an analysis provide project rankings which neatly complemented the set of research purpose priorities, but a richer dimension was added to the raw ranking of projects by weighted average quality scores. The interpretation of project priorities on the Return to Australia screen in Figure 3 is essentially similar to that for research purposes. The underlying ideal is to seek a portfolio of projects which lies in the upper right hand corner of the screen. For projects lying progressively closer to the lower left hand corner, increasingly limited support from appropriation funding is implied.

Post Workshop Tasks

To give effect to the determination of research priorities for the next planning period and to ensure that the substantial effort put into the preparatory phase and the main workshop bear fruit, a number of critically important tasks have to be completed following the main workshop.

Role Statements

The preparation and finalisation of Role Statements for each research purpose represent a major task on the critical path to the preparation of the Strategic Plan. Building on the preliminary work done during the workshop, Role Statements were developed for each research purpose in the period following the workshop.

The structure of each Role Statement followed an agreed format comprising five sections: Research Prospects, Priority Rating, Divisional Response, Divisional Strategy and Five Year Objectives. By way of example, the Role Statement for the Sheep research purpose is shown in Annex H.

Features of the Role Statements include a succinctly stated research strategy to be pursued by the Division over the next five years and a set of five year objectives which will allow assessment of whether the strategy has been successfully implemented. The set of five year objectives represent potential outcomes which can be used as performance indicators for assessing research performance.

Strategic Plan

The Division's Strategic Plan for 1992/93 to 1995/96 is in a sense the final product of the priorities exercise. The finalisation of the Plan in February 1993 and its distribution as a printed document the following month thus represents the culmination of a process which began in July of the previous year.

The bulk of the content of the Strategic Plan is appropriately taken up by the Role Statements for each of the ten research purposes. Supporting background information is provided on mission and strategy, management structure, programs and objectives, the existing (1992/93) research profile, and a review of the Division's major stakeholders. Additional sections discuss the internal and external environment, key issues and challenges in animal health and a summary description of the priority setting process.

Of particular note is the final section on organisation and management. The major goals and strategies for each of five research support areas (financial resources, human resources, commercialisation and technology transfer, external communication and international activities) are set out in a way which easily translates into performance indicators and will thus facilitate the assessment of the performance of the Division in each of these support areas.

Overall the Division's Strategic Plan is an impressive document not least for its brevity but more so for the delineation of strategies, goals and objectives in each performance area. Thus the Division's research staff have been given a clear view of the future strategic directions for the Division's research, and, in addition, the Division's stakeholders have been given a set of relevant benchmarks by which to judge the Division's performance over the next five years.

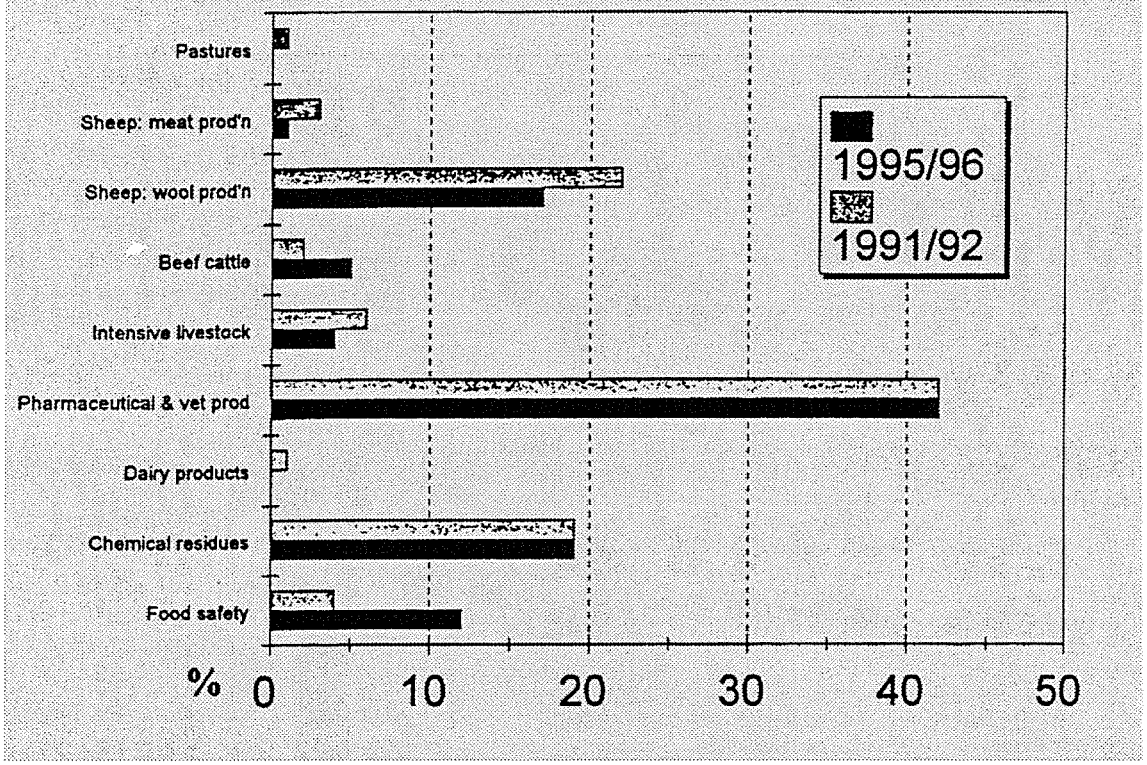
Resource Allocation

A major task which closely complements the determination of research priorities is the reallocation of resources to reflect the new set of priorities, and to enable the strategies and objectives in the new Strategic Plan to be achieved. To facilitate the process of resource reallocation the Division's management team developed a target profile of the distribution of research across socio-economic objectives (SEO's) for 1995-96, and compared the target profile with the corresponding 1991-92 profile (see Figure 4). The differences highlighted by the comparison of target and existing profiles provide an indication of the resource shifts which are needed to implement the new research priorities.

Communication

A significant task (which is at risk of being deferred or forgotten after the substantial effort required to determine research priorities) is the need to communicate the results of the priorities exercise to staff and stakeholders, and to get feedback from them. It is particularly important to involve research staff in the feedback process because the successful implementation of the Strategic Plan will hinge on their commitment to it. The building up of ownership of a new Strategic Plan is essential if that document is to fulfil its role as a valuable management tool.

Figure 4. Target Profile for Research Classified by SEO



In the Division of Animal Health, each program manager, as a member of the management team, undertook the task of discussing the process and results of the priorities exercise with their staff in some detail. Communication with external stakeholders occurred at two levels – discussion within the Division's Advisory Committee, some of whose members had participated in the priorities workshop, and distribution of the new Strategic Plan to internal and external stakeholders for information and comment.

By conducting a priority setting exercise as part of a systematic, logical and relatively open process and effectively communicating the results of that process to staff and external stakeholders, the Division's Management Team was able to undertake a crucially important function during a very sensitive period when the rural sector was in the midst of recession and research budgets were declining. It is a tribute to the management team that the exercise was completed in timely fashion and with the considerable merit of extending the frontiers of best practice by producing a Strategic Plan which provides an exemplary model for other CSIRO Divisions and other research agencies.

Annex A.

Determining Strategic and Project Priorities in the Division of Animal Health

Introduction

Strategic planning is a process of choosing our future. A strategic plan sets out where we want to be in , say, five years time, and describes how we are going to get there by documenting key goals and strategies.

By comparing that future with where we are now, gaps can be identified, and the required changes determined in order to move from here to there.

Because resources are limited and competing opportunities are many, it is important to choose those research activities that offer the highest expected return to the nation. In determining research priorities, the limited resources can be allocated to the identified priority activities.

By following this path in an open and systematic manner it becomes possible for participants to own the outcome of the process, and to justify the outcome to the stakeholders, to whom the Division is accountable. It is a means of demonstrating competency of management as well as identifying the research activities that will generate the greatest benefit to the nation.

The Steps

1. *Prepare a list of research "purposes" relevant to the Division*

- this will encompass current research areas plus any other areas that potentially offer opportunities to generate benefits for the Division's research users.
- the preferred approach is to prepare the list *ab initio* – as if the Division were starting from scratch with a clean slate.

2. *Collect supporting information and data for each research purpose relating to current situation and outlook, and covering each of the four criteria in the priorities framework viz-potential benefits; ability to capture; R&D potential; and R&D capacity. It may also be useful to assemble resources data relating to staff and budget by program/project for resource allocation decisions to be made in the light of a new or revised set of priorities.*

- examples are given in Attachment 1 of what was done at the corporate level for the plant and animal research purposes.
- future oriented assessments of research opportunities and constraints by stakeholder representatives could provide a useful external benchmark.
- situation and outlook data by industry and commodity provided in ABARE documents will be particularly valuable.
- key benchmark references will be the Division's own vision statement and other relevant planning documents.
- reference can also be made to other relevant documents such as the CSIRO Strategic and Operational Plans and the strategic plans for the Divisions of Animal Production; Tropical Animal Production; and Biomolecular Engineering.
- copies of relevant items from CSIRO plans are at Attachment 2.
- other relevant reference points will be the priorities identified by research funding bodies such as MRDC, WRDC in their planning documents.

- scenario analyses which assess the implications of alternative futures eg change of government, can also provide valuable strategic input.

3. *Apply the priorities framework ie assess each research purpose. against each criterion in the light of the supporting data and information and award a score (1-10) to each criterion for each research purpose*

- the scoring table used at the corporate level is at Attachment 3 and can easily be adapted to cover the Division's research purposes.
- the criteria are listed in Attachment 4.
- one or more iterations may be required to advance from preliminary scores to final scores.

4. *Draft role statements for each research purpose*

- a copy of the relevant corporate role statement is at Attachment 5.
- items to be covered include background information, goals, priority assessment, strategies for research, transfer and funding, and planned outcomes.

5. *Draft a strategic plan for the Division on the basis of the role statements*

- strategic plans based wholly or in part on the foregoing process include those for the Divisions of Water Resources, Soils, and Tropical Crops and Pastures.

6. *Implement the strategies and priorities by determining resource allocations for each research area*

- a comparison will be required of the present distribution of effort with the one implied by the identified priorities five years down the track.

7. *Assess the priority of existing projects and new proposals on dimensions:*
   – against research purpose priority
   – against project quality criteria

- a copy of a project scoring sheet is at Attachment 6.
- a copy of the resulting project priority screen is at Attachment 7.

8. *The priority of support areas may also be assessed in similar fashion.*

The Process

There are three broad stages to be gone through:

Stage 1 covers the pre-retreat preparation and encompasses steps 1 and 2 above, plus a preliminary scoring of each research purpose against each of the four criteria of the priorities framework independently by the participants who will do the scoring at the retreat.

- it is envisaged that information covering the classification/listing of research purposes, data and evaluation sheets for each research purpose, and the procedures to be followed will be circulated say a month in advance of the retreat to allow time for scoring, and processing of scores.
- in doing the scoring, it is important that participants do not agonise over whether a particular research purpose should get a score of say 5 versus 6, and as a result of the time and effort spent in scoring, become attached to their own scores. Ball park scores based on a perusal of the information provided plus the participant's own knowledge are all that are needed. With the sharing of information at the retreat, participants need to retain the flexibility and option to revise their scores as new information is received.
- it is also important for participants to wear their Division hats, rather than just be staunch defenders of their own programs and projects. This could be assisted in a

number of ways eg by classifying research purposes fairly broadly so that the direct link between a research purpose and a particular program or project is weakened ie they are not identical (see suggestion below); a second option could be to allow program managers to champion a particular research purpose but not to contribute to the scoring for that purpose, so that the role of the champion is limited to presenting objective information that is persuasive and will guide other scorers. Emphasis might also be given to the interests of the Division's research users and to industry linkages.

Stage 2 covers the workshop itself and encompasses steps 3 and 4, and 7 and 8. Preliminary scores would be reviewed in the light of presentations on each research purpose by the nominated champion for that research purpose, and discussion of data and scores, and revised if necessary. A second aim would be to prepare draft role statements for each research purpose. This will involve systematically setting out relevant information on background (eg information relating to each of the four criteria for the research purpose), the research goal, the priority assessment, and strategies to be pursued in the light of the priority assessment relating to research, transfer and funding.

- the primary focus of the exercise is on developing a basis for the allocation of appropriation funding to each research purpose, but it may also be relevant to specify external funding targets for each research purpose.

The workshop may also include indicative resource allocation to priority areas by comparing a target profile based on identified priorities with the existing distribution of effort.

In addition, project assessment can be undertaken by assigning priorities on two dimensions - a) the priority score of the research purpose(s) relevant to the project, and b) the quality of the project in terms of how the project rates against selected criteria. The latter will require a second scoring exercise to be undertaken, whilst for the former, a priority "score" can be derived from the location on the attractiveness-feasibility screen of the research purpose(s) which the project addresses. By comparing scores eg high/medium/low for the two dimensions, a project priority screen can be generated which allows ready assessment of project priorities (see Attachment 7).

Stage 3 represents the completion of the exercise, encompassing steps 5 and 6, and involves achieving a sign off by the participants on the identified priorities and the role statements. This may require a final review session attended by the participants. The final step will be the drafting and finalisation of the Division's strategic plan, and communicating the contents to stakeholders.

- the contents of the strategic plan could cover statements of mission, goals, the research environment, key issues identified for example by the Advisory Committee, a brief report on the priorities process and results, the set of agreed role statements, and a statement on resource allocation comparing for example the 1997 target profile of research effort with the existing one, plus any additional information on organisation and management.
- the strategic plan for the Division of Tropical Crops and Pastures is a useful role model in this context.
- a particularly useful follow through step might be to conduct a joint priorities workshop with relevant funding bodies such as the Meat Research Corporation to demonstrate to the MRC where you have got to, and to establish rapport and obtain feedback. At a minimum it would be desirable to provide the MRC with a presentation of the process and outcomes of the Division's priorities exercise.

Implementation Suggestions

List of research purposes

- one of the first tasks
- needs to cover all current and potential areas of the Division's research
- it is desirable not to draw up a list with inconsistent or overlapping classes eg a mix of research areas and disciplinary areas will lead to confusion because of the overlap. The current thrust of priority setting and planning in CSIRO is to outcome oriented and user oriented classes, and a listing consistent with that focus would be preferable. One option would be to use class level groupings from the Socio-Economic Objectives classification used in the corporate level priorities exercise.

Supporting data

- the sharing of information among participants, so that each operates off the same information base is a major aim of the priorities exercise.
- it is probably most efficient if data and evaluation sheets are drafted by the nominated champion for each research purpose.
- in relation to provision of data, I assume you have access to ABARE's Commodity Statistical Bulletin and the Agriculture and Resources Quarterly, which I would imagine would meet most of your needs.
- copies of relevant papers presented at the Outlook Conference are available. If you wish, I can arrange to obtain copies.
- I shall be happy to assist with any remaining gaps and with benefit assessments.

The Priorities Framework Criteria

- past experience in Divisions indicates participants' frequently get confused about the definitions of the criteria, and results in inconsistent and invalid scores
- the four criteria are intended to be independent so that double counting is avoided
- in particular, the assessment of potential research benefits should be unconstrained by less than 100% take up rates by the target group of users, leakages of the technology to competitors, or by the feasibility of doing the research. It should assume successful research and full uptake. The constraints are covered by the other three criteria.
- R&D potential is also confused frequently with R&D capacity.
- it will be important to ensure as far as possible that participants are quite clear about the definitions of each criterion and how it is applied before they undertake preliminary scoring. An initial review session for this purpose could be held during the first half of March.

Scoring

- definitions of what the values 1 and 10 represent need to be agreed on prior to preliminary scoring to achieve consistency and avoid confusion.
- a decision needs to be made who will be responsible for scoring, ie whose scores are to count in the identification of priorities.
- there may be substantial value in inviting selected stakeholder representatives to participate in the priorities scoring. The recent review of CSIRO's research for the rural industries recommended "involving industry, the market and other research providers in the planning process".
- to the extent that implementation will require ownership and commitment by all line managers then it would be desirable to have their participation

- but the actual scoring may be restricted to the group with responsibility for determining priorities and allocating resources. In the corporate level exercise, this group comprised the Executive Committee, although input was received from each Division. A similar arrangement might apply within the Division.

The Workshop

- the process should be agreed to in advance.
- facilities and services required need to be discussed, identified and arranged.

Contact Point

- it would be helpful for a Divisional contact person to be nominated with whom I can liaise.

Advisory Committee Input

- useful advice may be obtainable from the Divisions' Advisory Committee on key issues and research areas of significant potential benefit.
- if you wish I could prepare a questionnaire for Committee members; and if appropriate make a presentation to their next meeting (if this is scheduled prior to the workshop) on input they could usefully make to the exercise.
- the Division has already made use of the Advisory Committee in a priorities exercise.

Attachment 1

National Priorities Data Sheet

1. ***Subdivision:*** *Plant Production & Primary Products*

2. *Key Statistics (1987–88 unless specified otherwise)*

Size:

GVP	$9200 million
Value Added	$3851 million (forestry n.a.)
Av Protection	12% for all agriculture (excl. forestry)
Exports	$4792 million
Imports	$1443 million
World trade in cut flowers	($18 billion)

R&D:

National R&D (1986/87): $267.67m – 9.5% Aust R&D
CSIRO R&D (1988/89): $53.6m – 11.3% CSIRO R&D

SCA Inventory (30.6.89): 1730 professionals – CSIRO 20%
Quick and Booth

3. *Other Relevant Information*

- The government statement "Research, Innovation and Competitiveness" highlights the need to remain competitive and focus on sustaining the resource base.
- RIRC R&D plans

4. *Key Issues and Amenability to R&D*

Constraints:

- Environmental/sustainability issues – degradation/pesticides/chemicals Transport and transport infrastructure.
- Access to native forests for wood supply industry and lack of on-shore pulping facilities.
- Commonwealth/State coordination issues. Pricing policy. Commodity approach to research funding.
- Training.

Opportunities:

- Product quality. Product specification. Product development, packaging and presentation.
- Sustainable land management systems which also improve productivity.
- Application of new biologies. Opportunities to increase crop productivity and reduce losses from diseases, pests and weeds.
- Technology transfer/extension
- Better post-harvest technology to improve transportability of perishable products.

National Priorities Evaluation Sheet

1. *Subdivision: Plant Production & Primary Products*

2. *Attractiveness to Australia*

Potential Benefit

- Increased export earnings and import savings, particularly in forestry and horticulture
- Strategic investment in new biologies will have major impact on competitive position of the agricultural, forestry and biotechnology industries. Competitive production essential for competitive value adding for Australia.
- Capacity to shift nature of plant products to match global market shifts, especially to SE Asia.
- Production efficiency increases substantial
  - field crops – 2% pa – yields $100m GVP; $80m exports
  - horticulture – 4% pa – yields $80m GVP; $8m exports
  - 19forestry – reduction in area of native forests for wood supply from 7m ha to 1m ha in 30–40 years

Ability to Capture Benefits for Australia

- RIRFS actively contribute to priority formulation and allocate funds in line with industry problems
- Financial benefits will be captured by Australians. Vertical integration of Australian owned businesses will increase benefit to Australia. Products have well established marketing infrastructure. Field crop producers have a good record of innovation and adoption of new technologies. Horticultural industries less so, apart from grapes.
- In forestry, extent of investment in processing facilities by Australian companies will determine benefit captured in Australia.

3. *Feasibility*

R&D Potential

- 20% increases achievable by year 2000 provided current research capacity at least maintained and advances in science applied.
- Proven ability to cope with changing markets.
- High probability of achieving sustainable land use systems and reducing pesticides and chemicals to acceptable levels, providing capacity in the economic/environment subdivision is maintained.
- New biologies starting to enter a rapid growth in application research

R&D Capacity

- The problems are unique to Australia and must be addressed in Australia.
- Currently a lot of attention being given to improving the agricultural extension system to speed up adoption rates.
- Fragmentation of research effort between CSIRO, State departments and universities being overcome.

National Priorities Data Sheet

1. *Subdivision: Animal Production & Primary Products*

2. *Key Statistics (1987–88 unless specified otherwise)*

Size:

GVP	$12003 million
Value Added	$6195 million
Av Protection	12% for all agriculture
Exports	$7399 million
Imports	$97 million

R&D:

National expenditure (1986/87): $262m – 9.3% of total
CSIRO expenditure (1988/89): $86m – 18.2% of total
Major performers: CSIRO, State departments of Agriculture, universities

3. *Other Relevant Information*

4. *Key Issues and Amenability to R&D*

Constraints:

- Competition from heavily subsidised products from EEC and USA
- Competition with NZ post-1992 for domestic markets
- Continually declining terms of trade
- Declining productivity of soils and pastures
- Competition from synthetic and other fibres in apparel wool market
- Association of dietary animal fat with diseases of affluence tends to limit consumption of red meats and dairy products in western countries
- Increasing discrimination by customers on the basis of quality and purity (freedom from residues)
- Most Australian fisheries fully exploited

Opportunities:

- Greater market penetration and higher price by quality control and product specification
- Improve yield, marketability and quality (including leaner carcasses) through genetic, nutritional and immunological manipulation
- Increase proportion of high value finer wools in the national clip
- Cheaper, more effective and environmentally benign ways to control pests and diseases, especially through new vaccines
- Better ways to prepare primary animal products through the processing and marketing chain
- Increase range of products (eg cashmere) and species (eg goat, buffalo, native species)

National Priorities Evaluation Sheet

1. *Subdivision: Animal Production & Primary Products*

2. *Attractiveness to Australia*

Potential Benefit

- Expanding markets, especially for beef but also for flavour-modified lamb in Pacific rim countries (AMLC forecast 1990 – Japan 100,000 tonnes, Korea 65,000 tonnes).
- Cost reductions and increased product value through the application of new technologies to improved pest and disease control, increased growth rates, absence of pesticide residues, improved carcass composition.
- Environmental damage minimised and health enhanced through reduced pesticide usage
- Production efficiency increases of only 1% pa would yield $130m GVP, $74m exports. Could also lead to less pressure on grazing lands – greater sustainability.

Ability to Capture Benefits for Australia

- Demand for results attested by RIRF's willingness to fund and farmers' willingness to increase levies.
- Grazing industries are internationally competitive and depend strongly on Australian research to maintain their position.
- Good track record of technology transfer to farmers.
- Conservational management of fisheries depends on local research.
- Benefits to Australian community mainly through export earnings and assured supply of quality food at reasonable prices.
- Some leakage to overseas competitors, but a substantial part of research addresses problems specific to Australia.

3. *Feasibility*

R&D Potential

- Track record suggests good prospects for success, and heavy investment by RIRFs indicates they expect a good pay-off.
- In the last decade, advanced technologies (including genetic engineering, advances in immunology, gene mapping) have opened up new horizons in livestock research. Substantial benefits are emerging at an accelerating rate.

R&D Capacity

- Many problems and opportunities unique to Australian environment and production systems.
- Long history of successful research and well established skills and facilities to continue.
- CSIRO, State departments and universities are now developing a coordinated approach to major problems.

RESEARCH

ANIMAL PRODUCTION AND PRIMARY PRODUCTS

Livestock, fishing, primary products from animals

DOMINATED by wool and meat, animal production and primary products accounted for 11.1 per cent of total Australian exports in 1990–91. A well developed R&D infrastructure supports the strong export performance and underpins a high ability to capture research benefits. R&D potential and capacity are correspondingly high. CSIRO undertakes 26 per cent of the national R&D effort and provides a major strategic focus in this area. Rural industry R&D corporations and other external funds account for 29 per cent of CSIRO's expenditure on research for this sector.

Corporate goal

Improve the international competitiveness and sustainability of rural production systems.

Strategies

Research

Focus selective research on such national priorities as:

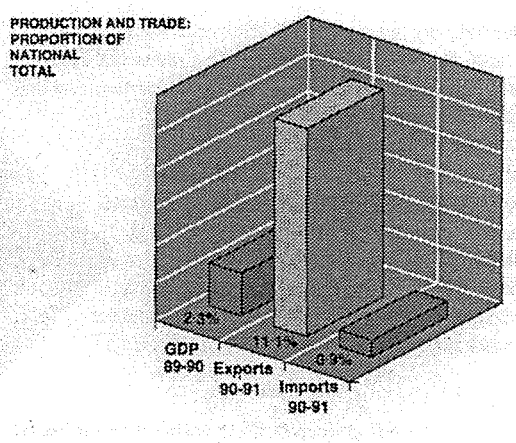
— rural industries with current or potential comparative advantage, particularly in Asian markets;
— diagnostic and control methods to improve preparedness against exotic diseases of livestock;
— economically and ecologically sustainable production systems;
— environmentally safe disease and pest control systems;
— product performance related to specific market needs, including new products, packaging systems and transport.

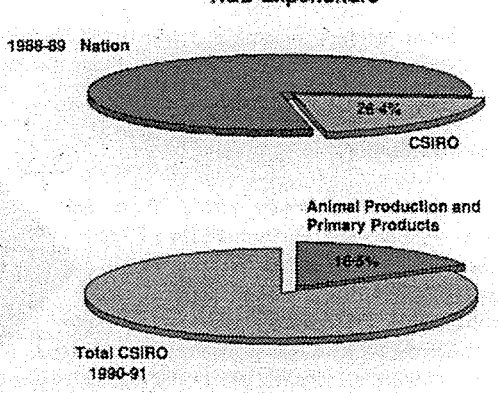
Improve the quality of meat and wool for high value markets; improve the efficiency of marketing, especially for wool.

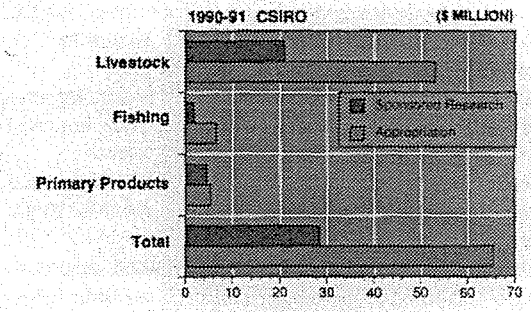
Focus pasture research on sustainable use of sown and native pastures for improved livestock productivity.

Focus fisheries research on prediction and management of fish stock abundance and distribution.

Emphasise biotechnology for genetic improvement of plant and animal productivity and product quality, and for pest and disease control.







(Sources: ABS, ABARE, CSIRO Corporate Planning Office)

	Evaluate a diagnostic kit for nematode egg DNA in collaboration with a State Department of Agriculture.
	Submit proposals to ACIAR for extension of projects in Asia and the Pacific.
Develop methods for prevention or treatment of poisoning diseases of livestock caused by naturally-occurring, environmental toxins of plant and microbial origin, to develop diagnostic tests for the toxins and means of reducing or eliminating them from items of food. *(7%)*	Complete field trials for the selection of a suitable formulation for the commercial lupinosis vaccine.
	Test a vaccine to protect sheep against annual ryegrass toxicity in pen trials.
	Develop a test to detect the toxin(s) responsible for acute *Phalaris* toxicity.
	Test pyrrolizidine alkaloid and corynetoxin binding/scavenging agents to determine if they protect against these toxins *in vivo*.
	Survey the level of phomopsins in Australian lupin seed.
	Transfer technology for the commercial production of the phomopsin mycotoxins.
	Transfer the technology for detecting the toxin(s) responsible for acute *Phalaris* toxicity to the Division of Plant Industry to assist in the breeding of non-toxic cultivars.
	Negotiate a commercial agreement for manufacture and marketing of a lupinosis vaccine and phomopsin ELISA.
	Submit a proposal for the establishment of a Cooperative Research Centre for Natural Product Development from Australian Bioresources for consideration in the second funding round.
Develop new or improved vaccines and diagnostic tests to control or eradicate economically important diseases of poultry. *(11%)*	Evaluate an attenuated infectious laryngotracheitis vaccine in chickens.
	Construct and evaluate recombinant viral vector vaccines for two important diseases of poultry.
	Transfer technology for propagation of infectious bursal disease virus monoclonal antibody and vaccine production to a commercial partner.
	Transfer technology for poultry diagnostics to joint venturer.
	Make the chicken anaemia agent indirect fluorescent antibody test available to industry.
	Negotiate agreements for commercialisation for two poultry vaccines against virus diseases.
	Negotiate funding from a commercial partner for funding of coccidiosis research.
Develop and maintain diagnostic services for exotic diseases of livestock and diseases of fish and to provide laboratory diagnostic support and training in exotic animal diseases for government agencies. *(17%)*	Develop diagnostic methods for scrapie, maedi/visna, African horse sickness, African swine fever and Rift Valley fever.
	Analyse the early results of field studies on foot-and-mouth disease in Thailand and provide Thai authorities with preliminary recommendations.
	Strengthen fish health services by initiating specific research activities into survival of pathogens in imported fish products and studies of Australian isolates of reoviruses, *Yersinia ruckeri* and *Aeromonas salmonicida*.
	Carry out training courses in exotic disease recognition for forty government and university veterinarians.
	Produce five exotic disease public awareness video programs and three specific disease training videos. Prepare scripts for 13 other programs.

Devise and assess new techniques for the identification and characterisation of pathogens that cause specified exotic diseases of livestock and to collaborate with other institutions and organisations in such research and in the transfer of the results of the research for the benefit of the Australian community. *(13%)*	Finalise new techniques for the detection and identification of the viruses of Bluetongue, Newcastle disease and Avian influenza, and the mycoplasmas of bovine and caprine pleuro–pneumonia, in clinical specimens. Complete assessment of the use of specific anti–peptide antibodies for the rapid pathotyping of Newcastle disease virus strains. Transfer diagnostic tests and procedures to AAHL's disease diagnostic program for identifying bluetongue, Newcastle disease and avian influenza virus, the virus–capture ELISA for classical swine fever virus, and ELISA procedures for detecting serum antibody to African swine fever, classical swinefever and malignant catarrhal fever viruses.
Develop new vaccines and diagnostic tests for selected exotic viral diseases of livestock and poultry. *(16%)*	Develop antigen capture ELISA's for bluetongue virus and epizootic haemorrhagic necrosis virus. Construct recombinant viral vectors with antigen genes from selected important poultry and sheep pathogens and assess their potential as vaccines. Test recombinant antigen and monoclonal antibody reagents in a competitive ELISA in Australian and overseas laboratories. Develop attenuated Bluetongue virus serotypes 3, 15 and 16 for later testing as vaccines. Evaluate with a commercial partner scaled up production of virus recombinants. Distribute nationally and internationally the monoclonal antibody and recombinant antigen reagents for bluetongue competitive ELISA. Negotiate continued funding of the avian viral vectors projects with a commercial partner.

Appropriation Total Allocation (includes earned appropriation revenues):	$19,618,000
Sponsored Research:	$8,400,000
Total Budget:	$28,018,000
Appropriation Capital:	$

Divisional External Earnings Target for 1991–92:
The Division expects that 29% of its total annual budget, excluding DPIE contribution to AAHL budget, will be spent from external funds in 1991–92 (comprising sponsored research funds and earned appropriation revenues) based on estimates as at 30 June 1991.

Australian Animal Health Laboratory Budget

CSIRO Appropriation Total Allocation:	$5,659,200
DPIE Appropriation Total Allocation:	$5,659,200
Sponsored Research:	$1,400,000
Total Budget:	$12,718,400

AAHL, Australia's high–security exotic disease preparedness facility, receives a matching contribution of $5,249,921 from the Department of Primary Industries and Energy.

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Armidale, Glebe, Parkville Budget

Appropriation Total Allocation:	$8,299,600
Sponsored Research:	$7,000,000
Total Budget:	$15,299,600

Inter-Divisional Collaboration, 1991–92:
During 1991–92 the Division (excluding AAHL) expects 36% of its research activities to involve collaboration with other CSIRO Divisions including the Divisions of Biomolecular Engineering and Animal Production. Of the 36%, approximately 21% is with Divisions in the Institute of Animal Production and Processing and 15% with Divisions in other Institutes.

Attachment 3

National Research Priorities August 1990

CSIRO Triennial Review of Research Priorities, 1991–2 to 1995–6

SUMMARY SCORE SHEET Name: _____

SEO Sub-division	Potential Benefits	Ability to Capture	R&D Potential	R&D Capacity
1. Plant Production and Primary Products				
2. Animal Production and Primary Products				
3. Rural-Based Manufacturing				
4. Minerals Industry				
5a. Energy Resources				
5b. Energy Supply				
6. Manufacturing Industries				
7. Information & Communication Industries				
8. Transport				
9. Construction				
10. Commercial Services				
11. Environmental Aspects of Economic Development				
12. Environmental Knowledge				
13. Health				
14. Defence				
15. Community Services				

Check List

1. It is preferable to **pencil** in your initial scores, as you may wish to change some following internal consistency checks.

2. **Scoring is on a 1 to 10 scale**. Score your lowest rated SEO(s) a 1 and the highest rated SEO(s) a 10, within each criterion. Having done so, score each of the remaining SEOs against the two benchmark scores.

3. If you score by SEO, then you will have to **check that you have been consistent** across the SEOs for each criterion. Check down the criterion column and adjust your scores accordingly.

4. **Record reasons for your scores** on the separate SEO score sheets and also note on them any questions you may like to raise in the group session at the Workshop.

Attachment 4

Research Priorities Criteria

Attractiveness

LIKELY BENEFITS OF RESEARCH

ATTRACTIVENESS TO AUSTRALIA measures the likely benefit of successful research and is the product of potential benefits and Australia's ability to capture the benefits. It is determined by factors over which research organisations have little direct control.

POTENTIAL BENEFITS

(Maximum economic, environmental and other social returns possible for Australia from technical improvement in the Sub-division.)

- Who are the potential users and customers and how will they benefit?
- What parts of industry and/or the community will benefit from successful research?
- How will R&D contribute to industry growth and improved competitiveness?
- What is the size of potential markets in Australia and overseas, in value terms, and what are their growth prospects over the medium to long term?
- Are there any other important benefits, direct and indirect- environmental (degradation avoided), social (social amenity, health, safety), employment creation?
- Are there spillover benefits to other industries?

ABILITY TO CAPTURE BENEFITS

(Ability of Australia's companies, utilities and organisations to convert technical progress into commercial or other returns)

- How will successful research be captured in Australia; what is Australia's ability to exploit the results?
- Are there potential commercial partners?
- Can the benefits from the research output be protected?
- What are the incentives/imperatives for adoption by commercial or public sectors?
- What is the industry's and/or community's commitment to R&D and technical innovation?
- Can Australian users compete internationally?
- Are there factors and conditions likely to promote or impede uptake, such as regulations, industry structure, physical conditions, ethical, cultural/social, environmental or political factors?

Feasibility

ABILITY TO ACHIEVE TECHNICAL PROGRESS

FEASIBILITY is a measure of the ability to achieve technical progress in Australia (per unit of R&D investment). It is the product of the R&D Potential and the R&D Capacity.

R&D POTENTIAL

(The technical potential of relevant areas of research and development: maturity of the fields; closeness of the technical and physical limits; breakthrough prospects)

- How close are the physical and technical limits in the relevant R&D?
- Are fields mature or developing? (Where is current technology on the S-curve?) - i.e., is the rate of change rapid, moderate or slow?
- What are the prospects for developing commercially valuable intellectual property, scientific breakthroughs, or major improvements in mature technologies and fields?

R&D CAPACITY

(A measure of the national research ability, in terms of the quality and quantity of resources, to achieve the R&D Potential and technical goals in a timely way)

- Would the proposed research effort (in terms of the quantity and quality of resources - critical mass and quality of researchers) be internationally/nationally competitive in the research field?
  –What is the competitive advantage(s) of Australia's (CSIRO's) research effort?
- Who are the major international (national) research competitors?
- Does Australia/CSIRO have the capacity to deliver the research, in terms of adequate skills, facilities, and time frame for effective application?

Attachment 5

Role Statement

2. ANIMAL PRODUCTION AND PRIMARY PRODUCTS
(Livestock, Fishing, Primary Products from Animals)

Indicators of Research Prospects

Major export earner, high research potential, well-developed R&D infrastructure: Contributed 2.5% of the nation's GDP and generated 17% of Australia's total exports in 1988–89. Wool and meat dominate, with high proportions of produce exported. Potential benefits are high, especially in wool and meat. Ability to capture research benefits is high reflecting Australia's strong track record in exploitation of new technology and the unique needs of Australian production conditions. Research potential and capacity are high, with internationally competitive research, and support from a well-developed R&D infrastructure involving the states, Commonwealth and industry R&D Corporations.

National Research Priority Rating

The attractiveness and feasibility of this research effort were rated sufficiently high to yield an overall rating of "strong emphasis" on the "Return to Australia" screen.

CSIRO Response

CSIRO provides major strategic focus: In 1986–87 8.3% of Australia's total R&D effort was for Animal Production and Primary Products. In 1989–90 CSIRO devoted 15.7% of its total expenditure to this sub-division. At around 30% of the national; R&D effort CSIRO undertakes strategic research on animal and pasture production and first stage processing of animal products, and applied research in collaboration with relevant State government departments. Its efforts are concentrated on the major extensive livestock industries, wool, sheep meats, beef and dairy as well as fisheries, pasture production and to a lesser extent the major intensive industries. Rural industry R&D Corporations and other external funds provide 29% of CSIRO funds for this sub-division. Public support is warranted because individuals cannot appropriate sufficient benefits from research to cover costs, particularly strategic research. CSIRO will seek closer collaboration with relevant Commonwealth and State government departments and industry to improve research uptake, to improve understanding of industry needs, and to build more effective multi-disciplinary research teams to tackle major issues.

CSIRO Strategy

Greater focus on product quality and marketability and more resources to environmental aspects of production.: External funding will continue at or above the CSIRO target level. CSIRO will increase research on techniques for measuring and improving product quality and on the efficiency and quality of first-stage processing. Pasture research will focus on sustainable pasture management. CSIRO will focus appropriation support for research into aspects of prediction and management of fish stock abundance and distribution. Livestock production research will receive relatively less support, with resources shifted to sustainability aspects of intensive and extensive livestock production *(see 11. Economic Development Environmental Aspects.)*

Particular areas of emphasis will include biotechnology for genetic improvement of plant and and animal productivity, and pest and disease resistance; biotechnology to improve pest and disease control, with particular regard to sustainability, product quality and cost-effectiveness; and relevant developments in information technologies.

Decision

Proposals should be selective, focusing particularly on product quality and marketability as well as sustainable production systems. Industry funding should increase in fisheries; external funding should remain at or above the CSIRO target level.

Attachment 6

Project Evaluation 1992/93

Project No.

Project Title:

A. PROJECT PRIORITY ASSESSMENT (H, M or L)

ARO Category

1. Soil Erosion/Structure
2. Salinity
3. Water Quality
4. Chemical Residues
5. Soil Acidity
6. Mine Site Rehabilitation
7. Field Crops (Wheat/Barley/Oilseeds etc)
8. Sugar
9. Horticulture
10. Pastures
11. Forestry
12. Land Use and Resource Assessment
13. Terrestrial Ecosystems
14. Land Disposal of Wastes
15. Mining Production/mineral analysis

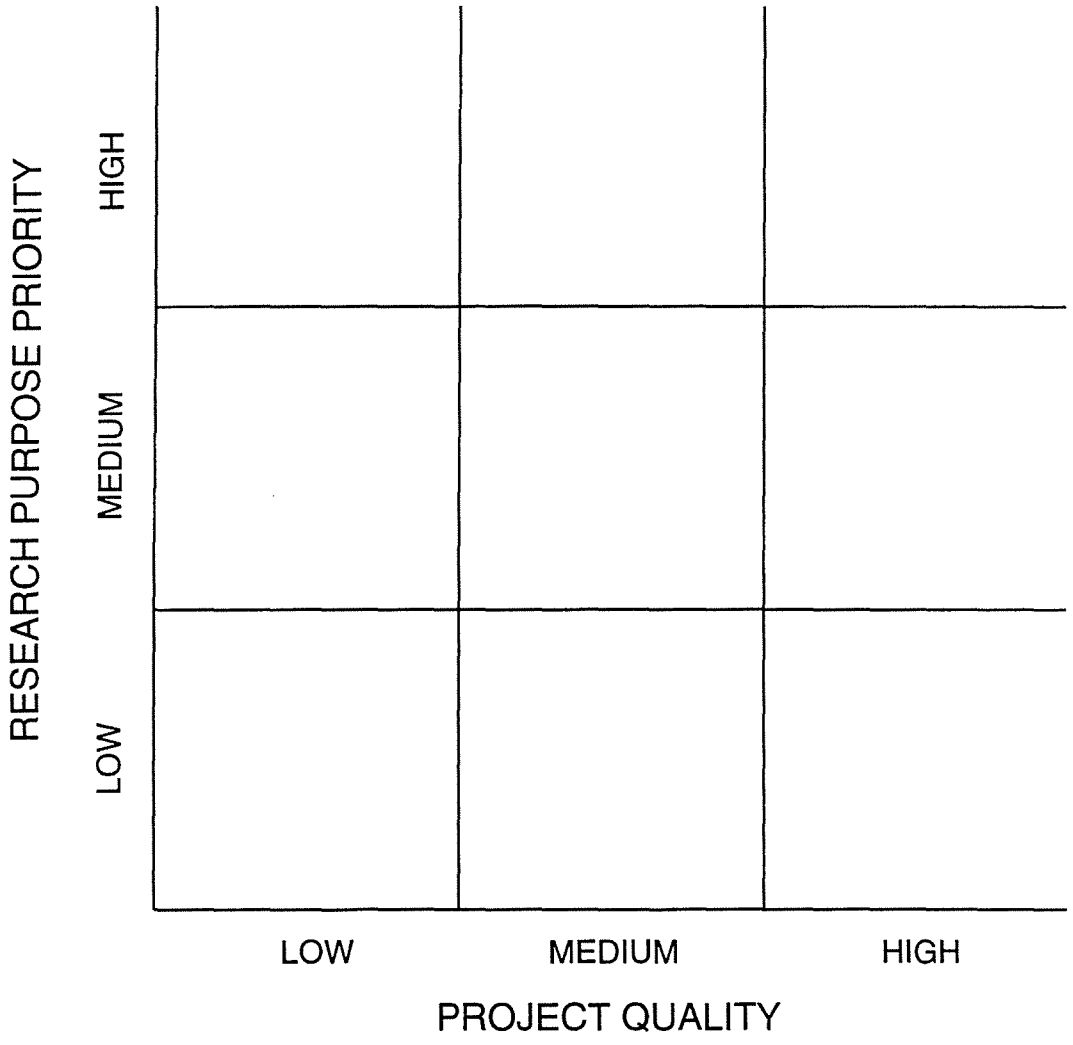
B. PROJECT QUALITY ASSESSMENT **Score** 5 – Yes or High 1 – No or Low

1. PROJECT GOALS The project has clearly defined objectives, outcomes and timetable.	
2. SIGNIFICANCE The economic, environmental and social benefit of this project to Australia.	
3. CONTRIBUTION TO OTHER PROJECTS The extent to which the projects influences the outcomes or effectiveness of collaborative or related projects.	
4. CLIENT INTERACTION The extent to which the project addresses agreed client needs and the degree to which results are likely to be adopted.	
5. COMMUNICATION The extent to which the project has an adequate plan for communication and technology transfer.	
6. R&D POTENTIAL Does the project address a fertile research area? Where is the current technology on the sigmoid curve?	
7. PROBABILITY OF SUCCESS The extent to which the project is likely to achieve its technical objectives on time and within budget.	
8. DIVISIONAL RESOURCES The requested resources are appropriate and available from the Division.	
9. EXTERNAL RESOURCES The proposed project is highly likely to attract external resources.	
10. PREVIOUS PERFORMANCE The project team members met previous targets.	
Total Score /50	

ATTRACTIVENESS:	Benefits	Categories 2,3
	Capture	Categories 4,5
FEASIBILITY:	Potential	Categories 6,7
	Capacity	Categories 8,9,10

Attachment 7

Project Priority Screen



Annex B.

CSIRO Division of Animal Health

DAH RESEARCH PURPOSE MATRIX	*Veterinary Products*	*Sheep Wool*	*Sheep Meat*	*Cattle*	*Dairy*	*Poultry*	*Pigs*	*Horses*	*Companion Animals*	*Aust. Fauna*	*Minor Ruminants*
Parasites											
Bacteria											
Viruses											
Toxins											

Does the research opportunity exist now and up to 5 years into the future? To be scored as high, medium or low.

Annex C.

DAH Priorities Data Sheet

1. RESEARCH PURPOSE: SHEEP

2. KEY STATISTICS: (1990-91 unless specified otherwise)

Size:	*Sheepmeat*	*Wool*	*TOTAL*
GVP($m)	433	4607	5040
Value Added($m)	234	2520	2754
Av Protection	3.2%	2.1%	2.2%
Exports($m)	417	2752	3169
Imports($m)	0.25	39	39.3
R&D:			
National Expenditure (1988-89) ($m)			169
CSIRO Expenditure ($m)	2.7	30.7	33
IAPP Expenditure ($m)	1.8	24.7	26

3. OTHER RELEVANT INFORMATION

4. KEY ISSUES AND AMENABILITY TO R&D

Constraints

- High level of wool stocks held by AWRC will dampen prices and incomes to growers.
- Shorn wool production is forecast to decline by 22% to 774kt in 1991-92.
- Wool production is expected to fall further as growers shift resources into other activities.
- Dry seasonal conditions have increased the proportion of finer wool in the clip, thus depressing prices for these wool prices.
- Competition with NZ post - 1992 for domestic markets.
- Lamb consumption is forecast to decline steadily in the medium term as competition from other meats remains intense.
- Australian sheep numbers are expected to fall significantly in short term which should contribute to an increase in sheep slaughterings.
- Supply increases have the potential to reduce the effectiveness of the FARL (Fresh Australian Range Lamb)program in raising prices to producers.

Opportunities

- Increased proportion of high value finer wools in the national clip.
- Lower prices will encourage greater consumption and improve competitiveness.
- Increased demand for wool in the 24-28 micron by China and Soviet Union.
- Improvement in economic growth of some of the major wool and sheepmeat buying countries and an assumed depreciation of the Australian dollar.
- Development of new wool products.
- Greater market penetration and higher price by quality control and product specification for lamb.
- Lamb and mutton prices are expected to firm in medium term in response to reduced supplies and increased export demand.
- Address animal welfare concerns of producers, consumers and the public at large.

DAH Priorities Evaluation Sheet

1. RESEARCH PURPOSE: SHEEP

2. ATTRACTIVENESS TO AUSTRALIA

Potential Benefit

- Productivity gains expected with the application of new technologies to improved pest and disease control, increased growth rates, absence of pesticide residues, improved carcass composition.
- Producers responding quicker to market trends with use of objective performance measurements.
- Vaccines more desirable than chemicals due to greater consumer acceptance and lower registration cost. Also, isolation of new synthetic chemicals is difficult and costly.
- As mutton is by product of wool industry potential benefits will be limited.
- Prospects for full restoration of Middle East market are not good.
- Production losses from flies, lice, worms and footrot are $45m, $194m, $245m and $18 respectively.
- Current costs of control of flies, lice, worms and footrot are $173m, $120m, $92m and $63m respectively.

Ability to Capture Benefits for Australia

- Number of potential manufacturers of animal health products is small and there exists scope for monopoly pricing of developed technologies.
- Good track record of technology transfer to farmers.
- High export orientation can lead to leakages of benefits. Lamb and mutton exports as a proportion of total production (Kgs) are around 15% and 50% respectively. The export price for mutton is not responsive to Australian supplies and therefore the ability to capture benefits from productivity improvements in the sheepmeat sector is high.
- Adoption of R&D which lifts value of mutton are likely to be rapid.
- Specialised production systems in Australia will enhance ability to capture benefits.

3. FEASIBILITY

R&D Potential

- Track record suggests good prospects for R&D success but there has been little success to date in overcoming animal health and nutritional problems relating to live sheep exports.
- Substantial research has been carried out in the area of recombinant vaccine technologies.

R&D Capacity

- Many problems and opportunities unique to Australian environment and broadacre production system.
- Long history of successful research and well established skills and facilities.
- CSIRO, State Departments and universities are now developing a co-ordinated approach to major problems
- Reduced availability of R&D funds from AWRDC.
- IAPP has good contacts with industry and links slowly being established with overseas companies for the development and marketing of commercial products.

Annex D.

Commodity Projections to 1996–97

Commodity	Unit	1992/93	1993/94	1994/95	1995/96	1996/97
Sheep Nos.	m	140	134	131	132	135
Wool Prodn	kt	768	733	720	718	738
Wool Exports 1991/92 $	$m	3532	3525	3469	3483	3528
Mutton Prodn	kt	376	343	306	275	255
Lamb Prodn	kt	300	300	296	292	295
Mutton Exports	kt	170	145	121	103	92
Lamb Exports	kt	42	42	41	40	40
Live Sheep Exports	m	4.5	5.1	5.7	6.2	6.5
Pig Nos.	'000	2533	2567	2624	2669	2688
Pigmeat Prodn	kt	318	325	330	339	349
Pigmeat Exports	kt	5	5	5	5	5
Poultrymeat Prodn	kt	474	483	490	500	511
Poultrymeat Exports	kt	1	1	1	1	1
Dairy Cow Nos.	'000	1534	1490	1455	1430	1410
Milk Prodn-Total	ML	6320	6324	6330	6378	6416
Cattle Nos. - All	m	23.0	23.3	23.8	24.3	24.9
Beef & Veal Prodn	kt	1656	1690	1730	1784	1834
Beef & Veal Exports 1991/92 $	$m	2451	2508	2538	2562	2600

Source: ABARE

Annex E.

Division of Animal Health Research Priorities

ABS SEO Division: Economic Development — Subdivision	Benefits	Capture	R&D Potential	R&D Capacity
1. Sheep				
2. Cattle				
3. Dairy				
4. Poultry				
5. Pigs				
6. Horses				
7. Companion Animals				
8. Australian Fauna				
9. Minor Ruminants				
10. Feral Animals				

SUMMARY CRITERIA *(read full criteria before scoring)*
Potential Benefits: the maximum returns possible from technological improvements\
Australia's Ability to Capture the Benefits: the ability of Australia's organisations to convert technical progress into commercial or other concerns
R&D Potential: the scientific or technical potential of relevant research areas
R&D Capacity: the resources available to successfully realise the research potential in a timely fashion

Annex F.

Project Scoring Sheet

CSIRO DIVISION OF ANIMAL HEALTH PROJECT EVALUATION 1992/93

Project No.

Project Title.

PROJECT QUALITY ASSESSMENT	SCORE 5 - Yes or High 1 - No or Low
1. PROJECT GOALS The project has clearly defined objectives, outcomes and timetable.	
2. SIGNIFICANCE. The economic, environmental and social benefit of this project to Australia.	
3. CONTRIBUTION TO OTHER PROJECTS. The extent to which the projects influences the outcomes or effectiveness of collaborative or related projects.	
4. CLIENT INTERACTION. The extent to which the project addresses agreed client needs and the degree to which results are likely to be adopted.	
5. COMMUNICATION. The extent to which the project has an adequate plan for communication and technology transfer.	
6. R&D POTENTIAL. Does the project address a fertile research area? Where is the current technology on the sigmoid curve?	
7. PROBABILITY OF SUCCESS. The extent to which the project is likely to achieve its technical objectives on time and within budget.	
8. EXTERNAL RESOURCES. The proposed project is highly likely to attract external resources.	
9. PREVIOUS PERFORMANCE. The project team members met previous targets.	
MAXIMUM TOTAL SCORE / 45	

ATTRACTIVENESS :	Benefits	Categories 2, 3
	Capture	Categories 4, 5
FEASIBILITY:	Potential	Categories 6, 7
	Capacity	Categories 8, 9

Annex G.

Research Priorities Workshop

13–14 October 1992

Day 1	**Setting Research Area Priorities**
8.30am	Review Objectives; Outcomes Revisit Research Purposes; Criteria; Scoring Process
	Summary Presentation of Preliminary Scores and Screens Discuss and Revise Scores
12.30pm	Lunch
1.30pm	Sign off on Revised Scores and Screens
	Agree on Format and Content of Role Statements Prepare Draft Role Statements – split into groups Review Draft Role Statements – plenary Revise and Sign off on Role Statements Discuss Preparation of Strategic Plan
Day 2	**Setting Project Priorities**
8.30am	Review Objectives; Outcomes Revisit Criteria; Scoring Process
	Summary Presentation of Preliminary Scores and Priorities Screen Discuss and Revise Scores
12.30pm	Lunch
1.30pm	Complete Discussion and Revision of Scores Present and Sign off on Project Scores and Priorities Screen
	Discuss Where to From Here, eg resource allocation; communication

Annex H.

Strategic Plan 1993

5.2 ROLE STATEMENTS

SHEEP

Research Prospects - Principal export earner in livestock commodities, high research potential and a highly developed R&D infrastructure. Wool is dominant export earner at $3500 M/annum and expected to remain at this level until 1996/97. Mutton exports about 50% and lamb exports around 15% of total production. Potential benefits are the highest for this category. Ability to capture benefits also very high reflecting Australia's strong track record in technology transfer, its international competitiveness, and the unique production conditions. Animal Health research has been a major contributor to export success in this sector and there continues to be significant potential for increased efficiency of production and improved product quality through research to improve the control of major endemic diseases, in particular, worms, blowflies, lice, footrot and plant poisoning diseases.

Priority Rating - Attractiveness and feasibility of research rated highest by a substantial margin over other categories to yield an overall rating of strongest emphasis on the "Return to Australia" screen.

Divisional Response - The Division is the major, single provider of animal health research for the sheep industry and currently attracts $2.4 M in funding from the Wool Research and Development Corporation. This is likely to decline until 1995/96 as income to the Wool Research and Development Fund is reduced and an increasing proportion of the fund is allocated to the post-farm research area. The Division will maintain emphasis on the wool industry in its appropriation-funded research with some redirection of resources into sustainable grazing systems and reduced pesticide use. The major strengths of the division in the management and control of internal and external parasitism and bacterial disease and plant poisoning correlate well with the livestock industry's national priorities for endemic diseases of sheep.

Divisional Strategy - The Division's research effort will address the sheep industry's principal objectives of achieving sustainable control of worms, blowflies, lice and footrot although research in footrot vaccines will decline when presently developed technology is transferred to industry. Priority will be given to developing products and systems to control disease with minimal use of chemicals which have undesirable residues in livestock products and the pastureland environment. Disease resistance will be enhanced using genetic selection and vaccination based on the application of modern molecular biology and improved methods for vaccine delivery. There will be some reduction in the more traditional areas of parasitology. Important plant poisoning diseases will continue to receive emphasis in treatment, prevention and reducing the risk of residues in meat products. Research on pharmaceuticals will continue with greater contribution being sought from Industry.

Five Year Objectives

- Develop commercial vaccine for caseous lymphadenitis in sheep
- Develop commercial footrot vaccine and diagnostic test
- Develop commercial lupinosis vaccine
- Treatment and prevention of annual ryegrass toxicity
- Assay for pyrrolizidine alkaloids in sheep meat
- Prototype vaccine for foot abscess
- Develop commercial fleece-rot vaccine
- Develop bacterial vectors for vaccine delivery
- Develop commercial vaccine against haemonchosis and trichostrongylosis
- Define genotypic and phenotypic markers for genetic selection for resistance to helminths
- PCR-based field assay for ivermectin resistance in worm populations
- Transfer decision support software for strategic worm control to the industry
- Prototype products for biological and chemotherapeutic control of worm populations on pasture
- Improved formulations for oral and topical application of antiparasitic agents

CSIRO Planning Reports, Papers and CSIRO Plans

Copies of the following reports, papers and plans can be obtained from the CSIRO Corporate Planning Office at PO Box 225, Dickson ACT 2602, or phone (06) 276 6177, email: cpo@cpo.csiro.au

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