

**NO 33 APRIL 1999**

**A QUALITATIVE ASSESSMENT OF THE  
RESEARCH CAPACITY AND COMMUNITY  
IMPACTS OF THREE RANDOMLY SELECTED  
ACIAR-SPONSORED PROJECTS**

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ISBN 1 86320 268 4

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## 1. INTRODUCTION

This small study follows from an earlier study (Mauldon 1998) that examined the external reviews of 111 ACIAR-sponsored large bilateral projects completed between 1990 and 1997. That study provided an overview of the effectiveness of the projects in terms of three criteria:

- their success in meeting project objectives (*technical success*);
- their *impact on research capacity*; and
- their *community impact generally* (on farmers, consumers, the environment, etc.).

In that earlier study, the assessment of *technical success* was satisfactorily addressed, as most reviews were able to address this aspect of the projects directly and with considerable thoroughness. The assessment of *impact on research capacity* was problematic, as the reviewers' terms of reference generally did not relate as directly to this outcome as they did to *technical success*. The assessment of *community impact generally* was most problematic of all, since reviewers' comments lacked focus on the implementation of project outcomes, and it was usually too early to assess implementation issues.

In the light of these problems, this report contains a more searching, but still qualitative, assessment of the magnitude and nature of:

- the *impact on research capacity*; and
- the *community impact generally* (on farmers, consumers, the environment, etc.)

of three projects, randomly selected from eighteen ACIAR-sponsored large, bilateral projects completed in 1994.

The next section of the report summarises the findings of the study, while the final section provides some background information about the projects.

## 2. THE FINDINGS

The projects selected were:

- CS2/1989/029 ('Utilisation of entomopathogenic nematodes to control insect pests in China');
- AS2/1989/013 ('Ecological and host-genetic control of internal parasites of small ruminants in the Pacific Islands'); and
- ANRE1/1990/039 ('Government policies in the Philippines beef industry').

This was a 'desktop' study, drawing on documentation held by ACIAR, and information gathered by telephone, email and some face-to-face communications with those involved in the projects in Australia and overseas. Table 1 summarises the findings of the study.

In Table 1, the impacts in the first three rows apply to the project's overseas partner country(ies). The next three rows refer to Australia. The last row (third party countries) gives the aggregated impacts on other countries.

It is stressed that the study has not attempted to assess the quality of the projects themselves—a task that ACIAR undertakes at the conclusion of each project through its external and internal reviews. However, when those reviews are undertaken insufficient time has elapsed to assess whether the expected impacts have in fact been realised. This is why a 1994 termination date for

the projects to be assessed was chosen. It allowed the accrual of four to five years of experience, but was not so long a period that any impacts would be overtaken by those from other sources of innovation.

**Table 1. A summary of the findings of an assessment of the research capacity and community impacts<sup>a</sup> of three ACIAR-sponsored projects.**

Impact on:	CS2/1989/029	AS2/1989/013	ANRE1/1990/039
<b>Target country</b>			
Research capacity	large	large	small
Community			
• commercialisation and farmer uptake	modest	small	small
• consumers and community welfare	small	none	none
<b>Australia</b>			
Research capacity	significant	significant	small
Community			
• commercialisation and farmer uptake	significant	modest	small
• consumers and community welfare	significant	modest	small
<b>Third party countries</b>			
	none	modest	none

<sup>a</sup> Impacts are ranked none < small < modest < significant < large.

Although it has been possible to come to some reasonably firm conclusions about most of the impacts of each of the three projects since their completion, it would be hazardous to make broad generalisations from the study of so few projects. Nevertheless, there are five observations which could be borne in mind for future research impact assessments.

**(i) *Ex post* impacts are not as large as *ex ante* expectations**

Expectations were held that many impacts would be large or significant fairly soon after the completion of each of the three projects. In the case of the beef project in the Philippines, this was expressed as a strong interest by officials of the Government of the Philippines before the project started. In the case of the entomopathogenic nematodes project in China and the small ruminant parasite project in the Pacific Islands the external reviewers expressed it at the time the projects were being completed.

In all three cases, most of the impacts were not as marked or as immediate as expected. The reasons were different in each case, and for two of the projects there may still be significant impacts. But it is clear that if impacts of the types examined are to be assured following the completion of a project, a mechanism needs to be in place to bring them about. This may need to be considered at the project design stage.

The extent to which ACIAR should be involved in implementation of research findings is an important policy issue since it is an activity that requires resources and must be monitored. ACIAR may not need to provide the major part of those resources or undertake that monitoring, but the assurance that such a mechanism is established would require considerable post-project involvement by ACIAR and possibly by project participants. Clearly, it is not a task to be taken on lightly.

**(ii) An impact on research capacity requires a focus on particular technologies and on an environment that is conducive to research**

Two of the projects terminated with research capacity in participating overseas countries continuing in good shape, while for the third there was no such continuing capacity. The two successful projects focused on institutions with a research ethos and on one or two specific technologies. The project which failed in this regard left no tangible research instrument (a model). This meant that those trained to work had nothing to work with. If developing a research capacity was seen to be the major objective of the project, it may have been better to focus on that alone and to locate it with a research group in, say, a university where, even if a useable model did not eventuate, there would be a commitment to seeing such a development through to completion.

**(iii) It is unreasonable to expect an immediate policy impact from research if there is no institutional structure**

Following from the preceding observation, any expectation that research can have an immediate policy impact needs to be addressed. Research on institution building is important. But if the institutional settings are not there (which raises profound development issues that go well beyond research) it would be naive to expect research to have an early impact on policy. Nevertheless, the ACIAR-sponsored project ANRE/1990/039, on beef industry policy in the Philippines, provided useful input into policy analysis, if not to policy change. It contributed to the preparation of a general equilibrium model prepared in another ACIAR-sponsored project in the Philippines (EFS/1988/038) which, in turn, has provided useful inputs into policy analysis.

**(iv) Intellectual property could be a source of delaying community impacts**

Whether intellectual property held as an outcome of (or input to) a project is a help or a hindrance to implementation (or how it can best be harnessed to facilitate implementation), needs to be addressed. In the case of the entomopathogenic nematodes project in China, the ownership by CSIRO of world patents was seen to favour early implementation through the involvement of a commercial joint-venture partner. In retrospect it may have been an impediment. Clearly defined property rights should lead to efficient commercial implementation, but they might also significantly delay community impacts.

**(v) It can take a very long time for some community impacts to appear**

For two of the projects, impacts have been small or modest *as yet*. Notwithstanding the early expectations held, all three of the Australian project leaders indicated that it takes a very long time to get many research outcomes to the stage of commercial development, uptake by farmers, and integration into policy. The leader of the entomopathogenic nematodes project in China compared his work with that of the commercialisation of *Bacillus thuringiensis* (Bt) which produces a toxin used to control a number of insect pests. This technology has been developed commercially, but it took thirty years to do so. The leader of the beef project in the Philippines said in his termination report that 'because of the way economic policies are formulated and the influence that particular groups are able to exert over decision makers, changes are unlikely to occur rapidly'.

If such observations can be made about these three projects, which veered towards applied research, they must have far more bearing on ACIAR-sponsored projects involving more strategic research.

### **3. THE PROJECTS**

All three projects began in 1990 or 1991 and ran until mid to late 1994. Each was of a fairly applied nature, in the sense of being orientated towards practical problems of the participating country(ies). The projects were expected to transfer reasonably well-developed research techniques and to lead to some changed practices in the community within a relatively short time of the project's completion. A brief résumé of each project's objectives and outcomes follows.

#### **Project CS2/1989/029 ('Utilisation of entomopathogenic nematodes to control insect pests in China')**

This project was commissioned through CSIRO's Division of Entomology in association with two research institutes in China. It was designed to develop suitable methods for the large-scale production, storage and transport of entomopathogenic nematodes, with a view to their use in the control of apple moth in fruit trees and cossid moth in urban street trees in China. It had a commercial orientation through the development of precise costing of production (giving potential investors and operators the information they need), and through large-scale field trials to demonstrate techniques of using nematodes as practical bio-pesticides in management systems.

The project met all its technical goals. Pilot mass rearing, processing and storage facilities were established in two locations; appropriate storage technologies for China were developed; costing spreadsheets were prepared; techniques for reducing numbers of nematodes required as bio-pesticides were developed; and ways of increasing the effectiveness of applications were demonstrated to farmers through large field trials.

#### **Project AS2/1989/013 ('Ecological and host-genetic control of internal parasites of small ruminants in the Pacific Islands')**

This project was commissioned through CSIRO's Division of Animal Health in association with departments of agriculture in Fiji, Solomon Islands, Tonga, Vanuatu and Western Samoa. It was designed to elucidate the epidemiology of internal parasites of sheep and goats in those countries and to develop potential control methods. These were to include: a minimal drenching program to reduce both the rate of development of anthelmintic resistance and the cost of control; a grazing-management system that requires little or no drenching; and the possibility of breeding lines of sheep and goats selected for their innate resistance to internal parasites. A computer model was to be built to aid the design of management strategies aimed at parasite control with minimal use of anthelmintics, and a formal assessment was to be made of the economic impact of any resulting control systems.

Most work was undertaken in Fiji, with some parasite population dynamics studies in Tonga. The epidemiology of parasites, which had been researched in an earlier ACIAR-sponsored project, was further defined, though the computer modelling of it did not advance to the point where it could be used as a management tool. However, a control system involving rapid rotation of sheep grazing under citrus trees was developed to demonstration stage on a

commercial farm in Fiji. No formal economic evaluation of this control system was undertaken, but it was realised that it would not be feasible in most Pacific Island flocks, which are small and tethered or herded.

Heritability studies found considerable genetic variation in parasite resistance in sheep. It was concluded that it is very worthwhile to select sheep for parasite resistance, particularly in the Fijian system of distributing breeding stock from multiplier flocks which themselves are sourced from a centralised closed flock. No heritability of resistance to parasites was detected in goats.

### **Project ANRE1/1990/039 ('Government policies in the Philippines beef industry')**

This project was commissioned through the University of Queensland's Department of Economics in association with the Philippines' Department of Agriculture. It was said to be a response to a government desire to evaluate that country's beef industry and to construct a model that could be used to analyse policies and put forward alternative procedures for formulating them. Policies influencing imports of beef and live cattle were to be a particular focus. A small adjunct study of factors affecting the adoption of artificial insemination in the breeding of beef cattle in the Philippines was also partly financed through the project.

Many papers describing features of the beef industry in the Philippines were published in a discussion paper series. Surveys of small cattle producers and of larger commercial feedlots provided a farm-level empirical base for the descriptive studies, but detailed information about marketing linkages proved impossible to obtain. This meant that the model linking the farm and marketing sectors with other parts of the economy and with households having various income levels was not constructed and the formal analysis of the welfare effects of existing or proposed policy arrangements was not undertaken.

### **Project impacts**

In accordance with the terms of reference, this paper evaluates impacts since the termination of each project in terms of:

- maintenance and development of research capacity, including access to new techniques in the overseas collaborating countries;
- whether the project's outcomes have proceeded to uptake through (where appropriate) commercialisation, extension or other services to farmers, conservation practices, etc. in collaborating countries;
- any flowthrough to consumers and improvement of community welfare generally in collaborating countries;
- any impacts in Australia; and
- any impacts in third party countries.

Because this was a short, desktop study, not all of these categories of impact could be followed through with confidence. Assessments in each case were informed by discussions with the ACIAR research project managers who, though they had not monitored the impacts of the projects, were well informed about the milieu in which the projects were set. The chief source of detailed information in each case was the Australian project leader.

Despite the mixed and sometimes sparse information base, a picture of the general impact of each project was built up with a reasonable degree of confidence. These assessments are qualitative, but the conclusions about each category of impact have been ordered on a scale

according to whether the impact is deemed to be negligible, small, modest, significant or large. These rankings should not be used to make comparisons of the size of impacts between, say, one participating country and another.

### **Project CS2/1989/029 ('Utilisation of entomopathogenic nematodes to control insect pests in China')**

The external reviewers of this project (at the time of project completion) had no doubt that it would have considerable impact in the near future. The technology had been developed to a point of commercialisation of production and distribution of nematodes. There were thought to be existing markets for large numbers of nematodes. Impacts on the ecology of China and the health of consumers were seen to be large. The technology was seen to have potentially a large flowthrough to other crops. Australia was seen to gain from an acceleration of cost-effective usage of nematodes as bio-pesticides in this country. In the event, impacts to date have been far more modest.

#### *Impact on research capacity*

Despite diminished expectations about commercialisation (see below), laboratory-based research capacity in both Chinese institutes involved in the project is being maintained. Field trials, which were developed to world best practice during the project, are also continuing at both institutes. Research contacts between the institutes and CSIRO have been maintained, with some 30 Chinese researchers visiting CSIRO since 1994. It can be concluded that the project's impact on research capacity in China has been large.

#### *Impact on commercialisation and uptake by farmers*

Despite considerable efforts by CSIRO to attract joint partners, there has been no investment in commercial production of nematodes. In part this may be the result of easing pressures for commercialisation within China, and in part due to the failure of negotiations about the sharing of intellectual property rights developed as a result of ACIAR-sponsored projects.

Control of codling moth in street trees in northern China, which started during the project, has continued with apparent success, serviced commercially from the pilot facility developed in one of the institutes during the project. However, this is a modest impact compared with the potential for commercialisation foreshadowed for apple moth control. The Australian project leader reported that, since the project's conclusion, large areas of older apple trees, in which the apple moth problem was most severe, have been cut down and replaced with young trees and new strains in which apple moth infestations are less of a problem. Although this has eased the immediate need for bio-pesticides, the project leader considers that it has merely delayed the demand for their commercialisation.

The project is unlikely to have any significant impact on extension and flow-through to farmers until there is a commercial facility producing nematodes. If this were to occur, there is also likely to be a flow-through impact on producers of some other crops, principally lychees, chives and rice. (ACIAR has already funded a project on nematode control of insect pests of lychees in China and approved, but not yet funded, a project on chives and rice.)

It can be concluded that the project's impact in terms of commercialisation and uptake of the technology has as yet been modest.

*Impact on consumers and community welfare*

There has undoubtedly been a small environmental and public amenity impact through the control of cossid moths in city street trees in some northern Chinese cities, but the major potential environmental and public health impacts through reductions in chemical pesticide use have not yet occurred. This could ultimately be a very large source of improvement in community welfare but it can be concluded that as yet there has been only a small impact on consumers and the community in general.

*Impact on Australia*

CSIRO's own pilot factory in its laboratory in Canberra makes commercial sales, and has, from time to time, exported nematodes. The Australian project leader said that this would not have been possible without ACIAR's funding of the China project. He also reported that, as a result of this project, CSIRO has been able to pursue work the results of which are being applied commercially in Australia in the control of scarab beetles in turf and some other high value horticultural plants. South African and US groups are also said to be interested in establishing factories in Australia using CSIRO's patented nematode culture technology.

Whereas the pay-off from many of these ventures is still more potential than actual, it can be concluded that the project has had a significant impact on Australia by sustaining CSIRO as world leader in this field of research. Australia has acquired intellectual property rights of potentially substantial commercial value.

*Impacts on third party countries*

Although the project was seen as having large potential impacts on other crops and in a range of environments in China and Australia, no impacts in other countries were mentioned. It can be concluded that, at this stage, there have been none.

**Project AS2/1989/013 ('Ecological and host-genetic control of internal parasites of small ruminants in the Pacific Islands')**

The external reviewers of this project considered that its outcomes were sufficiently developed to start impacting on the Pacific Islands' small ruminant industries soon after the project's completion. A demonstration, rapid-rotation control system was already operating on a commercial farm in Fiji. Training of extension workers was said to be occurring during the project, and an earlier ACIAR-funded extension publication had been widely circulated in Fiji. The major immediate impact of rotational grazing was seen to be in the commercial, large-flock sector where electric fencing is feasible (smaller flocks in villages are mainly tethered or herded).

The reviewers saw the largest potential impact on farming to be in the sheep industry in Fiji where, under government supervision, it would be possible to select for parasite resistance in MAFF's closed flock and breed resistant stock for distribution to producers. Research capacity in Fiji was seen to be well developed at the conclusion of the project, but it was feared that it would deteriorate unless refresher courses were organised to keep it, and the extension effort that would flow from it, intact.

Most of the reviewers' comments were focused on Fiji, with some attention to Tonga. Institutional structures were seen to be conducive to change in both those countries. No

comments were made about potential impacts in other participating overseas countries (Solomon Islands, Western Samoa and Vanuatu) or in Australia.

#### *Impact on research capacity*

To maintain the research momentum the reviewers had proposed intensive refresher courses, finalisation of the simulation modelling, support for the replacement of computer equipment in Fiji, and transfer of DNA fingerprinting technology to Fiji. Since the project's completion, MAFF has continued to train technicians and extension workers to support field applications. A CSIRO officer has participated in one such training course in Fiji. Computer modelling has continued in Australia, though has not been developed further in Fiji. MAFF reports that computing facilities are now much improved with recent purchases for the goat and sheep programs. However, staff training in the use of the computers is an area that needs to be addressed. The Australian project director considers that DNA fingerprinting technology is too expensive for Fiji unless continuing research support is provided from a developed country.

The Sustainable Parasite Control (SPARC) Group's electronic news circulation between Australian and Southeast Asian/Pacific Island research personnel has contributed to the maintenance of research capacity in small ruminant parasite control in the wet tropics since the project's completion. This system fosters exchange of information about parasite research and its implementation between the various countries. It has operated out of CSIRO but is currently being transferred to the Philippines.

The maintenance of research capacity in Fiji has also been assisted by the continuing involvement of a senior MAFF officer, who was a participant in project AS2/1989/013 and in cooperative research in the wet tropics through ACIAR's project AS1/1997/133 ('Sustainable endoparasite control for small ruminants in Southeast Asia') conducted under the aegis of the International Livestock Research Institute.

It can be concluded that, although research on goats may have fallen, a large impact has been made and sustained on research capacity at an applied level in Fiji and, through good regional cooperation, to a lesser extent in Tonga. The project does not appear to have had any impact on research capacity in the other participating Pacific Islands.

#### *Impact on commercialisation and uptake by farmers*

The impact over the last four to five years of rotational grazing systems to control parasites has been principally on sheep and goats grazed in larger commercial operations (about 30% of the animal numbers in Fiji and 20% in Tonga. However, MAFF reports that even in this sector uptake has been poor because of costs of electric fencing, poor farmer understanding and the inability of MAFF livestock officers to provide the close supervision needed for the implementation of the system. The demonstration rapid-rotation strategy which was in operation on a commercial farm at the end of the project is reported to have ceased because of a breakdown in the system, though the farmer concerned is said to be continuing to use rotational grazing in conjunction with reduced anthelmintic treatment. There appears to have been negligible uptake by smaller farmers because of the inapplicability of these techniques where small numbers of animals are tethered or herded, and the relatively low cost of drenching where it still works.

MAFF reports that sheep in its closed flock are being selected for breeding for parasite resistance. Each year the top young rams are selected on the basis of growth conformation at around five months. At six to seven months, animals are subjected to a faecal egg count and replacement rams are selected on the basis of the lowest count. This selection has now been in progress for about six years. There has been no monitoring of progress, but the farm managers in the MAFF system have been seeing some improvement in general flock health. There is no evidence of these benefits accruing to other farmers.

It can be concluded that the project, through its grazing management regimes, has had some impact on the larger commercial flocks in Fiji and Tonga, but these account for only small proportions of total animal numbers. The project has begun to improve the genetic resistance of sheep to parasites in Fiji through MAFF's breeding system, but it will be some years before this has any influence on farm production.

#### *Impact on consumers and community welfare*

No information was received about any flow-through impacts on consumers or on community welfare generally. Of course, given the place of agriculture in much of Pacific Island community life, any impact on farming could be expected to be highly correlated with community welfare generally. However, with only a small impact on uptake of rotational grazing, and no impact as yet of any genetic improvement, there is not likely to have been, at this stage, any benefits to consumers or the general community.

#### *Impact on Australia*

Although sheep and goats are not farmed in Australia's wet tropics, the Australian project leader considered that the project has contributed to Australia's research capacity in internal parasite control strategies by broadening the information base with 'outlier' observations that are useful in modelling Australian parasite problems. He also said that it is hoped that a joint CSIRO/University of New England project on goat management will soon start, and that results from this and related ACIAR-funded projects will give the project a head start. It can be concluded that the project has had a modest impact on Australia's research capacity but not, as yet, on any commercial applications.

The ACIAR program manager indicated that the impact of the project on Australian research capacity has been significant because it showed that parasite resistance has a heritability of about 0.3, high enough for a viable breeding program. This is now being implemented at both the research and farm level.

#### *Impact on third party countries*

In three of the five overseas countries participating in the project there appears to have been minimal impact on either research capacity or activities of farmers. However, this is only one of several projects sponsored through ACIAR that are researching small ruminant parasite control strategies in the wet tropics of Southeast Asia and the Pacific Islands. This effort is being augmented through the SPARC Group's information network. It can be concluded that the project is having a modest impact on research capacities of countries throughout the wet tropics, though whether this impact is as yet being felt at farm and wider community levels is not known.

### **Project ANRE1/1990/039 ('Government policies in the Philippines beef industry')**

No external review was undertaken at the end of this project. However, at the time of the project's implementation, a view was expressed in project documentation that, because of a strong commitment by the Government of the Philippines, there was a prospect of the project strongly influencing policies of the Philippines to the mutual benefit of that country and Australia. In retrospect, the project's outcomes (and hence its impacts) have been disappointing on most fronts. Given the institutional structure of policy formation in the Philippines, the assumed commitment of its Government to the project did not materialise.

#### *Impact on research capacity*

Since the project failed to construct a model of the beef industry, it has not made the continuing contribution to research capacity that had originally been intended. Nevertheless, an official of the Philippines' Department of Agriculture claimed that information from the project had been used to fine-tune information about the livestock sector within a general equilibrium model of the economy prepared in an earlier ACIAR-sponsored project in the Philippines.

Some middle-level officers in the Philippines' Department of Agriculture did receive policy analysis training and publication skills. However, these skills do not appear to have resided in a policy analysis group, and there is evidence that some of them have subsequently been lost to the Department of Agriculture by staff moving to the private sector. It can be concluded that the project has had, at best, only a small impact on research capacity.

#### *Impact on commercialisation and uptake by farmers*

The survey work on small cattle producers and large commercial feedlots, and the study on factors affecting the adoption of artificial insemination in the breeding of beef cattle, may have continued to inform extension and policy at the farm level. There may also have been some changes in perceptions about colour and weight requirements for imported cattle. There is no evidence, however, that the project stimulated any significant changes in farm practice or other commercial activities. At best, the project's impact on these aspects can have been no more than small.

#### *Impact on consumers and community welfare*

There is no evidence of any impact of the project on consumers in the Philippines. If there has been any impact on the wider community it would have been expressed through trade policy changes. Many changes in trade policy did occur during the period of the project in the context of the Uruguay Round negotiations. These changes included the replacement of quantitative import controls for beef and live cattle with tariff regimes. However, none of these changes could be attributed to the project itself. It can be concluded that the project has had no impact on consumer and community welfare.

#### *Impact on Australia*

The project's discussion paper series provides an information base about the industry in the Philippines which could be of value to Australian exporters who are major suppliers into that market. However, there is no evidence that industry or government in Australia has made any use of that material. There does not appear to have been any impact on research capacity in Australia. It can be concluded that the project has had negligible impact on Australia.

*Impact on third party countries*

There was no evidence of any impact of the project on third countries.

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