

APPENDIX B

Economic Analysis

It is virtually impossible to calculate the economic benefits of a single project in research or extension. If the project is successful, most of its benefits will come after the project. Predictions that far in the future simply require too many assumptions to have much value. Still, it is possible to appreciate the economic value of technology innovation.

The economics of research has been thoroughly studied, perhaps as thoroughly as any other investment for development. Much of this analysis is reported in: Arndt, Thomas, Dana Dalrymple, and Vernon Ruttan: Resource Allocation in National and International Agricultural Research; University of Minnesota Press, 1977. Some seven chapters are devoted to the economics of research. They generally indicate that "returns to a great deal of agricultural research have been two to three times higher than than returns to other agricultural investment." (p.4) No work since then seriously challenges this contention. Many of these studies are summarized in tables B-1 and B-2.

Methodology of these studies has been examined closely. The arguments that returns are understated are about equal to those that returns are overstated. The challenges come from methods of handling costs and returns, more than from the analytical methodology.

While the results of these studies give the proper signals, they do require some explanation. These studies are ex post facto analyses dealing with indigenous technology generation as well as with imported technology. They are not accurate predictors of any one research or extension project. Rather they indicate the inherent potential in technology innovation, particularly research. The real issue, then, is not whether research is a good investment, but how can it be organized and managed so that much of its potential can be achieved.

Minimum Capacity

Many countries today are going to have to rely heavily on imported technology. Importing technology from the international network raises the issue of national capacity. It is commonly accepted that a country needs a certain basic or minimum capacity in order to be able to take advantage of technology from the international network. Robert Evenson has done some tentative analysis of the returns to imported technology associated with the level of national capacity. It shows that the benefit stream associated with a national investment of \$1,000 can be as high as \$55,000 with "average indigenous research capability," compared to \$1700 with "no indigenous capability." (See Arndt et al, Table 9-1, p 250.)