APPENDIX A

A BENEFIT: COST ANALYSIS OF THE AGRONOMIC RESEARCH PROGRAM

The question has been raised as to whether or not the Puebla Project has placed too much emphasis on agronomic research. A partial answer to this question is provided in this section in the form of a summary of costs and some benefits associated with this program.

The costs involved in producing the limited capital and unlimited capital technologies are summarized in Table A.1. These include all costs of operation – salaries, equipment, materials, vehicles, etc. – plus consulting services.

TABLE A - 1. The cost of generating the maize technology of the Puebla Project.

Year	Costs of operation	Consulting costs	Total*
1967	18,294	6,245	28,956
1968	25,512	5,600	36,713
1969	28,945	9,293	45,121
1970**	30,534	5,230	42,201
1971**	32,039	3,142	41,513
Total	135,324	29,511	194,504

* Includes an overhead administrative charge of 18%.

** Eighty percent of operating costs and 64% of consulting costs were assigned to agronomic research on maize. The remaining costs were allocated to research on beans and the maize-beans association.

Agronomic research in 1970 and 1971 included, in addition to field trials with maize, work with beans and the maize-beans association. In these years, therefore, only 80 percent of the operating costs of the agronomic research program and 64 percent of the consulting expenses were considered as costs of generating the maize technologies.

When we refer in the following paragraphs to the benefits associated with the project technologies, it must be kept in mind that what we call benefits, are really the confounded effects of the production technologies plus the interaction between these technologies and the other components of the project (coordination, technical assistance, and evaluation).

In estimating the benefits associated with the project technologies, it was assumed that the Puebla Project might have adopted either of two strategies: (1) use the information on improved maize production practices available in 1967, the INIA technology, and devote its resources exclusively to technical assistance, coordination, and evaluation: or (2) choose, as it did, to include agronomic research as an integral part of its activities. The difference in cost of the two strategies is $194,504, as shown in Table A.1. The difference in benefits with the two strategies is obtained by subtracting the net benefits using the INIA technology from net benefits using the limited or unlimited capital technologies.

A net benefit, as used here, is the value of the net increase in yield (both grain and stover) with one of the improved technologies, less the value of the net increase in yield using the traditional technology, with both estimated for the same area. That is, net benefits using an improved technology are benefits over and above those obtained with the traditional technology.

In calculating benefits it was assumed that the rate of adoption of INIA and project recommendations would be the same. This assumption tends to favor the INIA technology inasmuch as the efficiency of this technology, as discussed earlier, is inferior to that of the Project recommendations. The values of the net increases in yield per dollar invested in fertilizers, for example, are 1.45, 1.94, and 1.62 for the INIA, limited capital, and unlimited capital technologies, respectively, as shown in Table 3.15.

To estimate total net benefits with the three technologies, it was further assumed that benefits would accrue over the 20-year period 1967-1986, and that adoption of the technologies would occur in the following manner: (1) for the years 1968-1973, the areas of adoption would be equal to those planted to maize by farmers on credit lists (see Table 9.6); and (2) for the period 1974-1986, the area of adoption would increase each year by 3.3 percent, the average increase in adoption by farmers on credit lists in 1971-1973.

Maize prices paid by the National Marketing Agency at their warehouses were $75.20 per ton in 1968-1972 and $96.00 per ton in 1973. It was assumed that the Agency would continue to purchase maize at the latter price during the years 1974-1986. The prices for maize used in estimating benefits were calculated by discounting the above prices for costs of harvesting, shelling, sacking and transport. These prices for maize in the field were $54.80 for the 1968-1972 period and $78.80 for 1973-1986. A price of $5.60 per ton was assigned to maize stover.

The net benefits attributable to the INIA and unlimited capital technologies for the 1967-1968 period are shown in Table A.2 as unadjusted additional benefits. The annual benefit values were adjusted to their corresponding values in 1967, assuming that capital would grow at an annual rate of 14 percent, and that the currency would decrease in value at a rate represented by the price indices published by the Bank of Mexico. This adjustment was made by multiplying the unadjusted values for a given year by the appropriate discount factor (Table A.2) and dividing the product by the relative price index. Research costs were adjusted to 1967 values in the same manner.

The total adjusted cost of the research for producing project recommendations for maize was $140,930. The total adjusted net benefits using the INIA and unlimited capital technologies were $2,556,224 and $5,634,691, respectively. The difference between the total adjusted net