UNIVERSITY OF MINNESOTA
INTERNATIONAL AGRICULTURAL PROGRAMS
and INTERNATIONAL SERVICE for NATIONAL
AGRICULTURAL RESEARCH (ISNAR)

AGRICULTURAL RESEARCH POLICY SEMINAR

APRIL 15-25, 1985

Proceeding for Modules I and II

EDITED BY
FRED HOEFER
CARL PRAY
VERNON W. RUTTAN
JULY 1, 1985

AGRICULTURAL EXTENSION SERVICE

The Data Base for Research Planning

B. R. Eddleman*
Mississippi State University

Work under the IR-6 Project has consisted of: 1) planning and coordination activities and 2) evaluation and analysis of the benefits and costs of agricultural research. Planning and coordination functions initially involved interactions with JPE/SEA (later CSRS/PAES) personnel, executive directors and staff of the Joint Council and the Users Advisory Board, and planning committees of the regional associations of the SAES and USDA research agencies.

Planning and Coordination

The major planning and coordination activities of the IR-6 staff include the following:

1. Assembling reference materials; review of planning documents; staff support to various SAES and USDA research planning committees; and consultations and regular meetings with personnel in JPE, CR, ERS, other USDA agencies, the Joint Council, the Users Advisory Board, OMB, and Congressional Committees and staff (including OTA).

2. Assistance in preparation and revision of ESCOP budget requests through CSRS; assistance in preparation of the FY 1982 and FY 1983 SEA budget; assistance in developing materials for CARET's use in Congressional Hearings on agricultural research; conduct of Special Analyses to provide information on the impact of inflation on costs of performing agricultural research; and development of a Capstone Paper for the SEA FY 1982 and FY 1983 budget requests for use with USDA officials, OMB and the Congress, and with State Legislatures by SAES directors and other officials of land-grant institutions.

3. Coordinating analysis and evaluation of agricultural research with researchers working on improved evaluation methodology under Regional Project NC-148 and with personnel in PAES/JPE; participation in cooperative efforts with ERS/USDA to improve coordination and foster collaborative research among agricultural economics entities (ERS and the land-grant institutions).

4. Assistance in the research planning activities of the four regional research planning committees of the SAES's to develop and assess priorities for agricultural research in each region; participation in special committees of the Joint Council to develop planning and coordination structures among providers of agricultural research, extension and teaching.

---

*Professor of Agricultural Economics and Economist, Mississippi Agricultural and Forestry Experiment Station.

Agricultural Research Policy Seminar, University of Minnesota, April 16, 1985.

5. Liaison with OMB personnel to provide evaluation and analysis information important to consideration of budget recommendations to Congress; provided information to OMB about research programs of SAES and uniqueness of agricultural research in the states; participated in a work group organized by OTA personnel conducting Congressional assessment of agricultural research and co-authored two papers for OTA addressing the topics of (a) the nature and flow of benefits from agricultural research and (b) postharvest technology research assessment.

6. Assisted SEA/JPE (later CSRS/PAES) personnel in organizing and executing a study of economic, social and environmental impacts of emerging technologies; assisted Federal Extension in developing a study on technology transfers; assisted the Forest Service (Southern Forestry Experiment Station), Mississippi State University College of Forestry and Duke University in planning, designing, and funding a collaborative research effort to identify forestry research evaluation needs and initiate an evaluation study of the southern pine plywood industry; served as a member of the Resource Group to the PAES/CSRS sponsored study on improving priority-setting processes in food and agricultural research and extension.

7. Assisted in the conduct of training sessions to acquaint various administrative groups with methods, procedures, results and criteria for research resource allocation decisions, including the Northeast SAES Administrators workshops for new department heads, Michigan State University Symposium on Research Evaluation Methodology, CSRS Annual Conferences, TVA Administrators Conference on Research Evaluation and Budget Development Processes, and various SAES Annual Conferences in the individual states.

8. Participated as invited speaker to various groups concerned with and influential in supporting agricultural research, including ARI meetings, NISARC meetings, Carolina Feed Industry Association, USDA Outlook Conference, Poultry and Egg Institute Research Advisory Council, the Southern Agribusiness Forum, and AAAS Sessions dealing with agricultural research.

The planning and coordination functions of the IR-6 staff were in keeping with the stated objectives of the IR-6 project. Primary interaction was with the JPE staff of SEA and the executive director of the staffs of the Joint Council and the Users Advisory Board. The IR-6 staff worked with these personnel in developing justifications and documentation for the SEA budget; in developing a common program structure for research and extension; in examining alternatives for planning and coordination structures among providers of agricultural research, extension and teaching under the Joint Council structure; and in exploring the potential for a common information system to serve SEA and the SAES administrators' needs. Additionally, interaction with other USDA research agencies (e.g., ERS, Forest Service, and Extension Service) and Administrative and Congressional agencies (e.g., OMB, OSTP, OTA and Congressional Committee staffs) was established. The IR-6 staff was actively involved in budget development activities of SEA for FY 1982 and for FY 1983.

Institutional Changes Affecting the IR-6 Project

Two institutional changes during 1981-82 resulted in a reduction of the planning and coordination functions of the IR-6 staff. One was the decision to establish CARET as a permanent committee and the employment of an agricultural research liaison person with NASULGC to track the budget through the Administration (OMB) and Congressional committees. Concurrently, the then Chairman of the Legislative Subcommittee of ESCOP instituted a process to involve SAES directors (or their representatives) in the budget development process within SEA. This reduced the need for a concentrated effort on these matters by IR-6 personnel.

The second institutional change was the demise of SEA and the JPE staff of SEA wherein the USDA agencies (CSRS, ARS, Extension) acquired personnel from JPE and established a program analysis and evaluation staff within each agency. Decisions were made by the IR-6 Advisory Committee to decentralize the planning and coordination activity by employing a regional investigator in each of the SAES regions, with the Leader of the Program Analysis and Evaluation Staff (PAES) of CSRS assuming the leadership role in the coordination of SAES and CSRS planning and evaluation activities with other USDA agencies. The Project Director of IR-6 became the Southern Regional investigator and maintained close liaison with the Leader of PAES within CSRS. Although PAES within CSRS was later disbanned, the IR-6 personnel have continued to interact with the CSRS staff and to provide an SAES input into Joint Council and User Advisory Board activities, as well as participate in planning and coordination functions within the SAES regions. Additionally, liaison has been established with some private-sector research laboratories. Since 1982, however, the planning and coordination activities of IR-6 have diminished (due to the reasons outlined above) and more emphasis has been placed on analysis and evaluation of agricultural research.

Analysis and Evaluation

Much of the IR-6 effort has been on research analysis and evaluation. The major activities were oriented to (a) economic analysis of the benefits and costs of agricultural research, (b) analysis of the distribution of these benefits and costs spatially and structurally, and (c) examining the implications for the planning, conduct and financing of agricultural research. These research analysis and evaluation efforts have included the following:

1. Maintaining a data base on public and private research expenditures for agriculture. Current investment in agricultural research by the public sector is approximately $1.7 billion annually. The private sector invests another $2.3 billion annually bringing the total to about $4.0 billion. Annual growth rates for public support has been 1.8 percent since 1967. (See Tables 1, 2 and 3.)

2. Attempts to determine the amount of farm productivity increase attributable to publicly supported research (or research and extension) investments. These studies have found that a 10 percent increase in production-oriented research and extension expenditures in public

institutions results in about a 0.3 to 0.6 (average of about 0.5) percent increase in farm productivity over a 13- to 15-year period. Further work has shown that these parameters have remained rather stable over time.

3. Estimates of the average and marginal rates of return on public investments in agricultural research and extension. The results from these studies indicate average rates of return to public agricultural research for the aggregate U. S. farm producing sector in the range from 30 to 50 percent annually. Studies reporting the marginal rates of return (i.e., the return to additional investment in public agricultural research) generally show returns ranging from 30 to 100 percent annually for the nation, and from 18 to 50 percent annually for the ten USDA farm production regions. Studies for some individual commodities or technologies are above, but few are below, these ranges. All the studies indicate rates of return to public agricultural research investments well above the 10 to 15 percent (above inflation) that private firms consider adequate to attract new investment. (See Table 4)

4. Estimates of value added in primary farm production for major commodities by state, sub-regional, regional, and national geographical entities. Value added measures were related to farm labor, farm assets and investments in agricultural research within each geographical entity. The analysis revealed states and regions where substantial underinvestment in public research relative to value added in farming occurs. Use of value added measures for examining societal impacts of research revealed that the rate of return to additional investment in research that impacts on non-consumed inputs in the production process (e.g., labor, land, and durable capital) was much higher for poultry and livestock (other than dairy) than for research impacting on consumed inputs (e.g., feed, medicines, etc.).

5. Analysis of the geographical effects of public agricultural research with regard who pays and who benefits from the research. Spillover effects among states and regions through the transfer of technology and research results within and among agricultural producing regions were estimated. Only about one-third of the benefits from basic research were estimated to remain within the state conducting the research, whereas from one-half to two-thirds of the change in farm productivity attributable to applied technology-oriented research is realized within the state conducting the research.

6. Estimating the income distribution effects among various family income groups of public agricultural research. Tax revenues of the Federal and state governments are the major source of funding for the research. Both savings in the cost of food purchases and tax incidence in relation to family income tend to benefit lower income groups relatively more than higher income groups. Net benefits per dollar of agricultural research expenditures (i.e., the savings in food costs minus taxes paid to support the research) ranges from about $15 per family for the lowest income group (under $5,000 annually) to $5 per family for the highest income group (over $20,000 annually). Even those families in the highest income class receive substantial net economic

benefits from public research investments that increase productivity in the farm sector. (See Table 5)

7. Measuring the spillover benefits to producers and consumers within and outside regions conducting the research. The spillover benefits to both producers and consumers outside the region conducting the research vary from about 1:1 for the Northeast Region to 40:1 for the Northern Plains Region. The national average for all regions is around 4:1, with the Mountain, Delta States, and Corn Belt regions also exhibiting greater than average benefit spillover ratios. Because a major portion of these spillover benefits go to consumers, those regions (and states) with higher concentrations of population (i.e., Northeast, Corn Belt, Pacific, Appalachian, and Southeast regions) are major beneficiaries of the public agricultural research conducted throughout the U.S. (See Table 6 and Figure 2). More recent studies have examined the spill-in effects as well as the spill-out effects on producers from agricultural research and extension. (See Table 7)

8. Other IR-6 studies have examined the productivity of research in the post-harvest sector (e.g., processing and distribution subsectors), the value of maintenance research, and a more disaggregated analysis of the transferability of research results and technology among homogeneous producing areas with implications for coordination of the planning, financing and conduct of the research.

Current Status of IR-6 Work

In general, much remains to be done in improving the planning and coordination of agricultural research among the public sector performers and between the public and private sector research entities. Since planning and coordination are continual processes, these objectives can never be fully accomplished. Moreover, no single interregional project can provide for the range of planning and coordination activities demanded of such a large, decentralized research establishment.

The institutional changes within the USDA agencies (i.e., disbanning of a centralized JPE and, subsequently, PAES/CSRS unit), the demise of SEA as an organizational unit within USDA, the creation of other entities tc carry out some of the coordinating and information disseminating functions between the SAES and Administration and Congressional personnel, and increased participation of SAES administrators in budget development processes, provided for many of the planning and coordinating activities of IR-6 staff to be carried out by others. The IR-6 effort was subsequently focused more toward the provision of the results from research evaluation and analysis studies and other information to assist SAES and CSRS personnel in these tasks. To this end the work under IR-6 has contributed importantly to planning and coordination among the performing entities.

The IR-6 effort related to analysis and evaluation has been the major focus of the project during the past two years. This research has contributed importantly to an understanding of the productivity of production-oriented agricultural research, the distribution of research

benefits among various groups in society and among geographical areas, and the rationale for a publicly supported agricultural research establishment. The results from IR-6 and other studies have provided the methodology for addressing important agricultural research and technology policy issues. Empirical measurement of some of the relationships involved has progressed, but empirical applications of the methodology remain limited.

Our knowledge about the economic benefits from public sector agricultural research from both a productivity and a distributional standpoint has increased. But our understanding of some of the other types of effects such as institutional, natural resource, environmental and structural changes in the agricultural industry associated with technology advances and public sector research remains inadequate. Development of criteria and objective information regarding normative values that influence the choices and priorities placed on public sector agricultural research programs has been limited. Insufficient knowledge still exists regarding the processes by which basic and applied research interact to enhance innovation in agriculture. The role of institutional innovation, shared institutional processes, and various kinds of funding arrangements (e.g., formula funding, competitive grants, public-private sector funding, etc.) in removing the constraints to technology development has not been adequately assessed.

Productivity of research in the areas of farm management decision making, marketing and food distribution, and public agricultural policy has not been analyzed to the degree that farm production-oriented research has been studied. Much of the analysis of production-oriented research has been directed to measuring the economic benefits that accrue to groups within the United States. The spillover effects to consumers (and producers of farm and food commodities) in other nations through U. S. agricultural exports has not been adequately assessed in the IR-6 effort.

Future Orientation of the IR-6 Effort

Areas of work under the IR-6 project that have not been completed or have targeted for future investigation include:

1. Analysis of the contribution to cost reduction and productivity of research on farm commodity marketing, processing and distribution; farm management decision making research; and public policy research.

2. Analysis of the value to society and the necessity for maintenance research for plants and animals to preserve previous productivity gains.

3. Disaggregated analyses of geographical transferability of research results and production technology (and associated spillover benefits) among producer groups (within the U. S. and to other countries), and the geographical flows of food and agricultural commodities (and associated benefits).

4. Systematic analysis of commodity-specific productivity advances and identification of associated research areas where new technology can be expected to have high potential for productivity payoff.

5. Systematic analysis of the potential payoff in the food and agricultural sector from emerging technologies such as biotechnologies, electronic computers for decision making and information-related activities, robotics, and selected energy conserving technologies.

6. Systematic analysis of the differential impacts of technological advance versus institutional forces (e.g., farm commodity price programs, pecuniary economies in the buying of purchased farm inputs and the selling of farm products, federal tax structures, etc.) on the long-run profitability and resulting size distribution of farm firms.

7. Systematic evaluation of the processes by which basic and applied research and public and private research interact to enhance innovation.

TABLE 1. AMOUNT AND RELATIVE IMPORTANCE OF RESEARCH PERFORMED BY FUNDING SOURCES

PERFORMING ENTITY & FUNDING SOURCE	1967 AMOUNT	1982 CURRENT AMOUNT	1982 CONSTANT 1967 AMOUNT	1983 CURRENT AMOUNT
	(Mil. Dol.)			
STATE RESEARCH				
USDA & OTHER FED. AGENCY	88.2	343.0	114.8	339.0
STATE APPROP.	118.6	545.2	182.5	576.5
SALES AND OTHER SOURCES	26.6	169.4	56.7	181.2
	233.4	1,057.6	354.0	1096.7
(PERCENT)	(54.3)		(62.5)	(64.3)
USDA RESEARCH				
CSRS & ARS	144.7	442.5	148.1	431.4
ERS	14.6	43.7	14.6	43.0
FS	37.2	131.2	43.9	124.8
OTHER	—	17.1	5.7	7.7
	196.5	634.5	212.3	606.9
(PERCENT)	(45.7)		(37.5)	(35.6)
TOTAL STATE & FEDERAL RESEARCH	429.9	1,692.1	566.3	1703.6

TABLE 2. ANNUAL RATES OF GROWTH IN PUBLIC FUNDING OF RESEARCH FOR SELECTED 15-YEAR PERIODS

PERFORMING ENTITY AND FUNDING SOURCE	ANNUAL GROWTH RATE (CONSTANT 1967 DOLLARS) 1919-34	1935-50	1951-66	1967-82
	percent			
STATE RESEARCH				
USDA & OTHER FEDERAL AGENCY	4.4	3.4	4.9	1.8
STATE APPROP. & OTHER SOURCES	2.9	7.3	6.3	3.4
	3.4	6.0	5.9	2.8
USDA RESEARCH	0.1	5.6	6.4	0.5
TOTAL STATE AND FEDERAL RESEARCH	1.6	5.8	6.1	1.8

TABLE 3. **PRIVATE INDUSTRY R & D FUNDS FOR AGRICULTURAL PRODUCTS**

PROGRAM CATEGORIES	MILLIONS OF 1979 DOLLARS	MILLIONS OF 1984 DOLLARS
FARM INPUTS		
PLANT BREEDING, PESTICIDES AND NUTRIENTS	497	
ANIMAL BREEDING, HEALTH AND FEEDS	287	
FARM MACHINERY AND EQUIPMENT	225	
	1,009	1425
(PERCENT)	(57.6)	(62.0)
PROCESSING AND DISTRIBUTION		
FOOD TRANSPORT AND PROCESSING MACHINERY	145	
FOOD, TOBACCO AND NATURAL FIBER PROCESSING	470	
PACKAGING MATERIALS	129	
	744	872
(PERCENT)	(42.4)	(38.0)
TOTAL PRIVATE INDUSTRY AGRICULTURAL R & D	1,753	2297

Table 4. Empirical rate of return estimates for agricultural research investment

Study (date)	Commodity	Time Period	Internal Rate of Return (Percent)
Index Number Approach			
Griliches (1958)	Hybrid Corn	1940-55	35-40
Griliches (1958)	Hybrid Sorghum	1940-57	20
Peterson (1967)	Poultry	1915-60	21-25
Schmitz & Seckler (1970)	Tomato Harvestor	1958-67	37-46
Peterson & Fitzharris (1975)	Aggregate (all crops & livestock)		16-28[a]
		1937-42	50
		1947-57	51
		1957-62	49
		1967-72	34
Regression Analysis Approach			
Griliches (1964)	Aggregate	1949-59	35-40
Peterson (1966)	Poultry	1915-60	21
Evenson (1968)	Aggregate	1949-59	47
Lu & Cline (1977)	Aggregate	1939-48	30
		1949-59	28
		1959-69	26
		1969-72	24
Knutson (1977)	Aggregate	1939-48	50
		1949-58	47
		1959-68	39
		1969-72	36
White, Havlicek & Otto (1978)	Aggregate	1929-41	36[b]
		1942-57	32[b]
		1958-77	28[b]
Lu & Cline (1978)	Aggregate-Northeast	1939-72	16[c]
	-Appalachian	1939-72	23[c]
	-Southeast	1939-72	15[c]
	-Delta States	1939-72	28[c]
	-Lake States	1939-72	35[c]
	-Corn Belt	1939-72	27[c]
	-Northern Plains	1939-72	23[c]
	-Southern Plains	1939-72	14[c]
	-Mountain	1939-72	22[c]
	-Pacific	1939-72	44[c]
Davis (1979)	Aggregate	1949	100[d]
		1954	79[d]
		1959	66[d]
		1964	37[d]
		1969	37[d]
		1974	37[d]
Bedahl & Peterson (1976)	Cash Grains	1969	36
	Poultry	1969	37
	Dairy	1969	46
	Livestock	1969	47
Evenson, Kuttan & Waggoner (1979)	All Agr. Research	1868-1926	65
	Technology-Oriented	1927-50	95
	Science-Oriented	1927-50	110
	Technology-Oriented-South	1948-71	130
	-North	1948-71	93
	-West	1948-71	95
	Science-Oriented	1948-71	45
Norton (1980)	Cash Grains	1974	35[e]
	Poultry	1974	46[e]
	Dairy	1974	51[e]
	Livestock	1974	88[e]

(Continued)

Table 4. Empirical rate of return estimates for agricultural research investment (continued)

Study (date)	Commodity	Time Period	Internal Rate of Return (Percent)
Otto & Havlicek (1981)	Southern Region-In State-Corn	1967-79	152
	-Soybeans	1967-79	n.s.[f]
	-Wheat	1967-79	79
	-Out of State-Corn	1967-79	10
	-Soybeans	1967-79	42
	-Wheat	1967-79	62
	North Central Region-In State-Corn	1967-79	210
	-Soybeans	1967-79	188
	-Wheat	1967-79	148
	Out of State-Corn	1967-79	49
	-Soybeans	1967-79	31
	-Wheat	1967-79	28

[a] Estimates account for displaced workers.

[b] The estimates were reduced by one-third to correct for omission of private research.

[c] The estimates were reduced by one-fifth to correct for omission of private research.

[d] Estimates are based on cross-sectional data using real output and deflated research. Estimates are high because extension is omitted and a small adjustment for private research is used. If adjustments were made these rates would be around 20% for 1964-79.

[e] These estimates correspond to the mean lags used by Bredahl and Peterson (1976).

[f] n.s.--not statistically significantly different from zero.

Table 5. Relationship of costs and benefits of agricultural research to family income

Class	Average Family Income[a]	Average Benefits per family[b]	Federal Taxes for Agricultural Research per family[c]	States Taxes for Agricultural Research per family[d]	Total Taxes for Agricultural Research per family[e]	Benefit-Cost Ratio[f]
	dollars					
Under 5,000	3,981	16.20	.43	.88	1.31	12.37
5,000-8,000	7,922	19.06	1.77	2.05	3.82	4.99
8,000-12,000	10,528	20.63	3.19	2.85	6.04	3.42
12,000-15,000	13,458	22.13	5.29	3.97	9.26	2.39
15,000-20,000	17,371	25.91	8.40	5.59	13.99	1.85
Over 20,000	28,953	30.74	15.78	9.82	25.60	1.20

[a] Source: U.S. Dept. of Commerce, Bureau of the Census, Current Population Reports, Series P-60, No. 101, "Money Income in 1974 of Families and Persons in the U.S.," U.S. Government Printing Office, Washington, DC, 1976.

[b] Expressed in present value. Total consumer benefits are calculated according to the equation

$$TB_C = 1/2 \times MVP_r \times RE \times D$$

where TB_C is total consumer benefits from ag-food research; MVP_r is marginal value product of research; RE is production-oriented research expenditures in 1974 (Budget of the U.S. Government; USDA, Inventory of Agricultural Research; U.S. Dept. of the Treasury); and D is the discount factor over 13 years at 10%. Total consumer benefits are allocated to income classes according to the level of food expenditures (Gallo, Anthony E. and William T. Boehm, "Food Expenditures by Income Group," National Food Review, NFT-3, USDA, ESCS, Washington, DC, June 1978). It was conservatively estimated that one-half of the total net benefits accrued to consumers over the thirteen-year time span.

[c] Production-oriented research expenditures for Agricultural Research Service, Economic Research Service and the Federal Government's Share of State Agricultural Experiment Stations are allocated among income groups according to the distribution of Federal personal income taxes (U.S. Advisory Commission on Intergovernmental Relations, 1974).

[d] State funded production-oriented agricultural research expenditures are allocated among income groups according to the distribution of state personal income and general sales taxes (U.S. Advisory Commission on Intergovernmental Relations, 1974).

[e] Summation of Federal and State taxes for agricultural research per family.

[f] Average benefits from agricultural research expenditures per family divided by total taxes for agricultural research per family.

Table 6. Regional distribution of the benefits of production-oriented agricultural research and extension investment.

Region	Total Producer and Consumer Benefits per $1 R&E Investment[a]		Ratio of Spillovers to Regional Benefits	Actual Ratio of Federal to State R&E Expenditures[b] 1949-1976
	Inside the Region	Outside the Region		
Northeast	$28.39	$13.14	.46	.97
Lake States	7.93	36.82	4.64	1.10
Corn Belt	5.19	37.95	7.32	1.25
Northern Plains	1.20	47.96	40.10	1.63
Appalachian	8.19	34.01	4.15	1.60
Southeast	7.98	34.45	4.32	1.37
Delta States	3.38	39.38	11.65	1.80
Southern Plains	8.05	37.99	4.72	2.10
Mountain	2.72	40.35	14.85	2.35
Pacific	7.88	34.76	4.41	.90
All regions	$ 8.62	$34.84	4.04	1.38

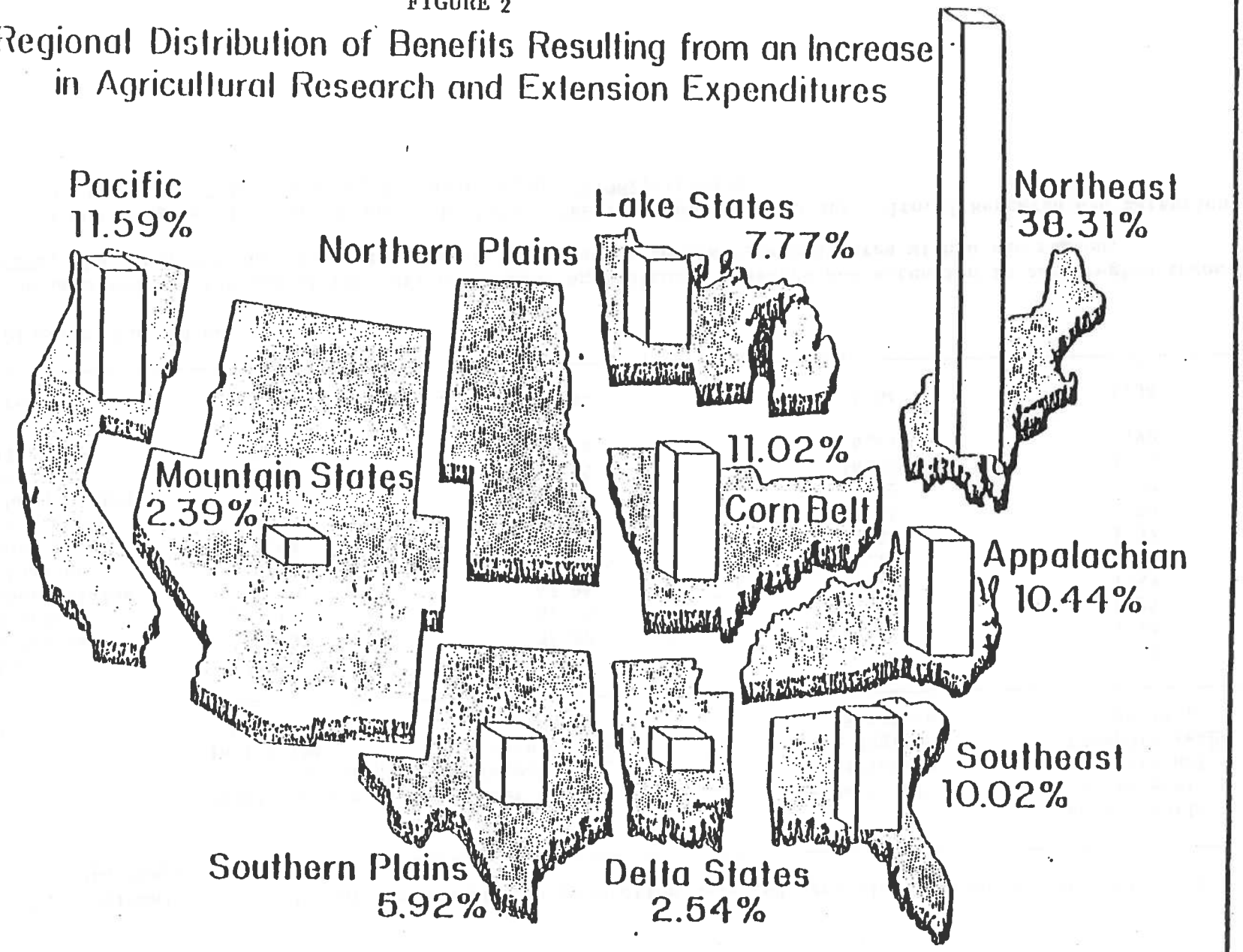
a/ Discounted at 10 percent.

b/ Includes federal funding of production-oriented agricultural research and extension in each region through CSRS, ARS, ERS, SCS and Cooperative Extension relative to state expenditures within the region.

Source: Rod F. Ziemer, F.C. White and P. L. Cline, "Regional Welfare and Agricultural Research and Extension in the U. S.," Agricultural Administration, 9(1982):167-178.

FIGURE 2

Regional Distribution of Benefits Resulting from an Increase in Agricultural Research and Extension Expenditures



Source: Rod F. Ziemer, F. C. White and P. L. Cline, "Regional Welfare and Agricultural Research and Extension in the U.S., "Agricultural Administration, 9(1982):167-178.

Table 7. Regional Estimates of Benefits and Funding of Production-Oriented Agricultural Research and Extension: Averages for the 1977-81 Period Expressed in 1972 Dollars

Region	Marginal Product	Regional Rate of Return	Average Annual Regional Benefits	Average Annual Spillovers	Ratio of Spillovers to Regional Benefits	Average Annual Spill-ins	Ratio of Federal-State Expenditures
	(Dollars)	(Percent)	---(Million Dollars)---			(Million Dollars)	
Northeast	2.72	23	254.23	839.04	3.30	368.88	1.03
Lake States	6.31	53	407.13	533.66	1.31	591.12	.67
Corn Belt	9.55	74	905.05	654.73	.72	1,314.15	.90
Northern Plains	9.04	71	482.05	449.33	.93	699.31	.56
Appalachian	3.63	31	309.87	685.00	2.21	449.29	.90
Southeast	3.68	32	292.02	663.98	2.27	423.49	.53
Delta	4.20	36	215.02	442.16	2.06	308.16	.64
Southern Plains	8.38	67	365.28	335.64	.92	530.00	.69
Mountain	5.18	44	312.42	544.91	1.74	453.26	.72
Pacific	6.03	51	495.86	708.99	1.43	719.78	.32
Aggregate	5.70	48	4,038.93	5,857.45	1.45	5,857.45	.68