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# Graphically Speaking

BY GREGORY M. PERRY

## Research Expenditures by Science Area in Agriculture and Natural Resources



The CRIS data base tracks research expenditures for agricultural experiment stations, forestry labs and veterinarian schools at the U.S. Land Grant Universities. Research is categorized into 78 fields of science for reporting purposes. These 78 fields were placed into 13 major groups for presentation here. In 1997, about one-third of all expenditures were in two groups—Environmental and Applied Biology (\$421 million) and Nutrition and Physiology (\$320 million). A summary of expenditures in the other science areas for 1982 and 1997 is provided in Figure 1. (All comparisons are in 1997 dollars.)

There was a 32 percent real increase in all research expenditures from 1982 to 1997, as reported by CRIS. Figure 1 illustrates the explosive growth in Molecular Biology research during the 1980's and 1990's. Molecular Biology includes research in recombinant DNA technology, cloning, gene therapy and mutations. Of the \$178 million allocated to Molecular Biology, nearly half was spent on plant research.

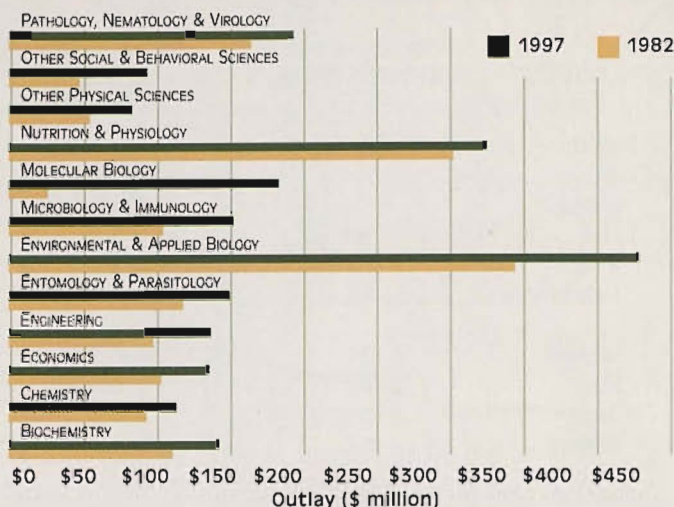
A number of other physical and biological science areas also experi-

enced growth well in excess of the 32 percent average, including Microbiology and Immunology, Engineering, and Other Physical Sciences. The Other Physical Sciences category includes geology, geography, hydrology, statistics, meteorology, and physics. Growth in Nutrition and Physiology, Genetics and Pathology, Nematology and Virology was substantially below average.

Expenditures in the social and behavioral sciences represented \$223 million in 1997, 60 percent of which was in economics. Growth in the social and behavioral sciences was outstripped by growth in the Other Social Sciences category, which included information and communications, anthropology, law, and history.

Despite the growth in real expenditures, the number of scientist years declined in nine of these 13 fields (Figure 2). In Economics, for example, although real funding increased by 34 percent from 1982 to 1997, the number of scientist years declined by 11 percent and the number of support staff dropped slightly. The real increase in research expenditures in economics, coupled with a decline in scientists and support staff suggest

### 1 Real expenditures have increased in all fields



that (1) there was a real cost increase in the non-human cost of doing economics research or, more likely, (2) real salaries for economists and support staff increased from 1982 to 1997. Similar patterns exist in most other fields.

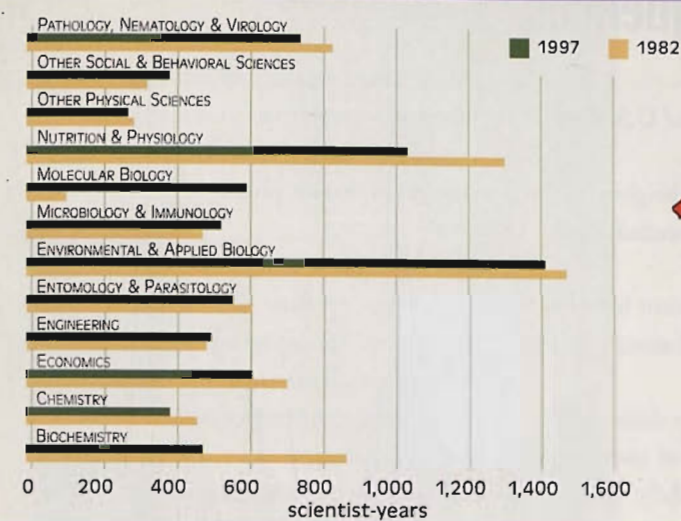
### Expenditures by Funding Source

Another interesting perspective is to examine how sources of research funding differ by major science groups. There are seven major sources of research funds: (1) USDA formula funds, (2) USDA grants (including NRI, special grants and cooperative agreements), (3) USDA funds from other sources, (4) Other federal funds, (5) State appropriations, (6) Industry grants, and (7) Other.

The mix of funding sources differs in significant ways for the social sciences versus the life sciences. This difference is illustrated when comparing funding sources for Economics versus Microbiology/Immunology (Figures 3 and 4). From 1982 to 1997 Economics was more dependent on USDA formula funds than any other field. This dependence has declined over time, however, from 25.2 percent in 1982 to 13.2 percent in 1997.



## 2 Scientist years have declined in most fields



Microbiology/Immunology USDA formula fund expenditures declined from 14 percent in 1982 to 6.5 percent in 1997. The other source of hard funds is state appropriations. For economics, state appropriations represented about 50 percent of all expenditures throughout the 1982-97 time period. State funds supporting Microbiology/Immunology have also remained at about 41 percent of total expenditures throughout this 15 year time period.

Taken together, about 64 percent of expenditures in economics were hard-funded in 1997, down from about 75 percent in 1982. Microbiology/Immunology research has been much less dependent on hard funding, so declines in hard funding (from 56 to 47 percent) have been less noticeable. The shift away from hard to soft funding probably contributed to the decline of scientist positions during a time of real budget increases.

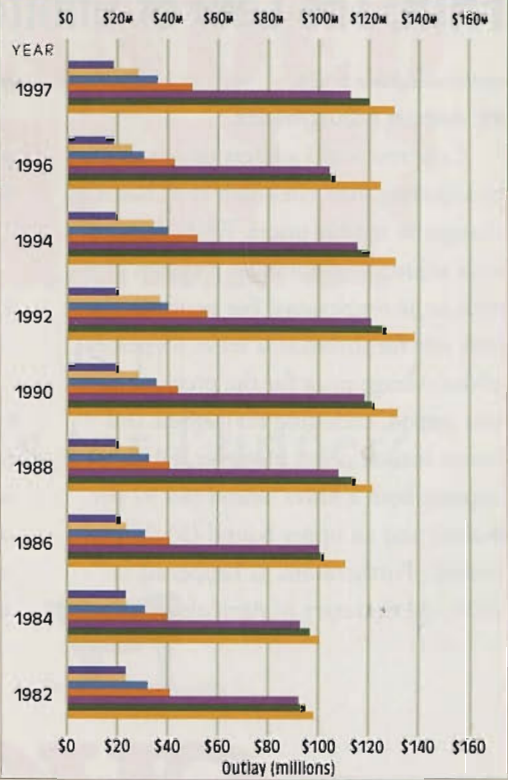
The lower amount of hard funding in Microbiology/Immunology is offset by much larger appropriations from other sources at the federal, state, and local levels. At my home institution (Oregon State University), microbiologists received funding from NOAA, NSF, the Public Health Ser-

vice, as well as other public and private universities and private companies. Another source is direct appropriation by Congress. For example, an article in the June 24, 2000 *Congressional Quarterly Weekly* identifies a number of multimillion dollar projects that U.S. Senators have, in recent years, funded to support research at their home state universities.

Much of the loss in hard funding in economics has been replaced by USDA grants. In 1982, USDA grants totaled \$475,000, or less than one percent of research expenditures in economics. By 1997, they totaled over \$11 million or more than eight percent of all expenditures. Of this amount, \$7.6 million came from NRI grants. In 1996-97, CSREES provided about \$87 million in total funding for the NRI, of which only \$1.5 million was directed toward a specific area in economics (marketing and international trade). This information suggests economists received most of their NRI support from multi-disciplinary projects.

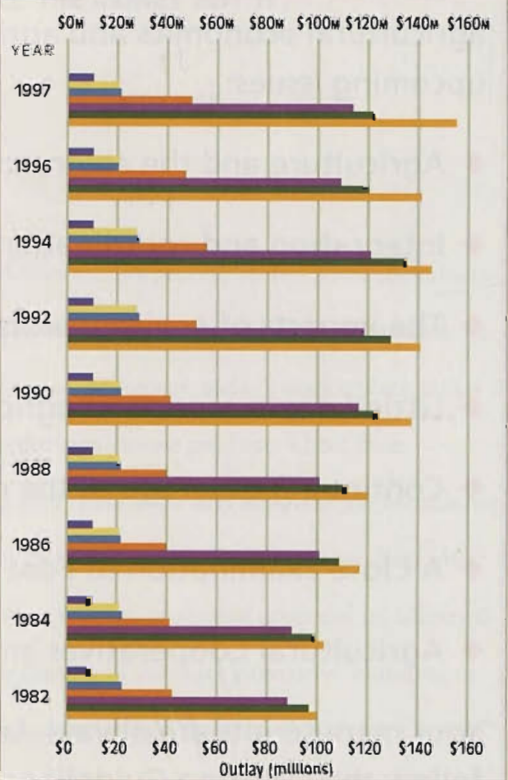
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## 3 Expenditures in Economics



\*BY SOURCE OF FUNDS

## 4 Expenditures Microbiology & Immunology



\*BY SOURCE OF FUNDS