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Washington, D.C. 20548

Resources, Community, and
Economic Development Division

B-271812

June 14, 1996

The Honorable John R. Kasich
Chairman, Committee on the Budget
House of Representatives

Dear Mr. Chairman:

The Agricultural Research Service (ARS), an agency of the U.S. Department of Agriculture (USDA), conducts research on foods, fibers, soil, water, and other natural resources. For fiscal year 1996, ARS received an appropriation of \$710 million to carry out its research activities at over 100 locations in the United States and abroad and \$30.2 million in multiyear funds for the construction or modernization of buildings and facilities.

As part of the Committee's efforts to oversee the federal government's budget, you asked us to provide you with certain information relating to ARS' research activities. Specifically, this report provides information on the (1) number of projects and budgeted amount for each of ARS' research program areas for fiscal year 1996; (2) number of, and dollar amount allocated to, ongoing research projects that have two characteristics for which information is contained in ARS' automated database, namely, those projects that involve mostly nonbasic research¹ and those not classified by ARS as high-priority research;² and (3) number of, and dollar amount allocated to, selected groups of projects that have one or more of three additional characteristics, namely, those projects that were not subject to peer reviews, had specific, identifiable beneficiaries, or ARS has proposed discontinuing.

¹In this report, nonbasic research is defined as applied and developmental research, which produces knowledge relevant to a technology or service and is generally completed in a few years. In contrast, basic research creates new knowledge and may take years to complete.

²ARS considers all projects it decides to undertake to be priority research, but some projects are in high-priority research areas, as shown in ARS' 6-year implementation plan.

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RESULTS IN BRIEF

As of January 29, 1996, ARS had funded 1,198 projects in six research program areas at an estimated cost of \$648 million—about 91 percent of its fiscal year 1996 appropriation for research. Three research areas—plant productivity, animal productivity, and commodity conversion and delivery—accounted for about 73 percent of the funds and projects. ARS planned to allocate an additional \$24 million to projects that will start or be renewed later in the fiscal year. The remaining \$38 million of its research appropriation went to the National Agricultural Library, repair and maintenance expenses, and miscellaneous requirements.

On the basis of our review of information contained in ARS' automated database of 1,198 ongoing ARS research projects, we identified 495 projects (valued at \$257 million) that involve mostly nonbasic research, 432 projects (valued at \$220 million) that are deemed to be outside a high-priority research area, and 148 projects (valued at \$78 million) that are mostly nonbasic research and outside a high-priority research area.

Information on ARS' total project inventory was not readily available regarding the other three characteristics. However, according to ARS' records, (1) 42 projects (valued at \$32 million) were not likely to be subject to peer reviews because the projects were conducted by an external organization and were funded via ARS' appropriations, (2) 173 projects (valued at \$114 million) had specific, identifiable beneficiaries, and (3) 50 projects (valued at \$28 million) were proposed by ARS to be discontinued in response to Office of Management and Budget and USDA requests that it identify ways to streamline its budget request.

BACKGROUND

ARS is USDA's largest in-house research agency, employing about 1,900 scientists at more than 100 federal laboratories in the United States and abroad. ARS' mission is to develop new knowledge and technology that will ensure an abundance of high-quality agricultural commodities and products at reasonable prices to meet the increasing needs of an expanding economy and to provide for continued improvement in the standard of living for all Americans.

ARS carries out several different research activities. These activities include (1) research projects that are conducted in-house by ARS scientists, (2) research projects that are conducted by an external organization and funded via ARS' appropriations, and (3) research projects that are conducted by ARS and/or

private firms via cooperative research and development agreements (CRADA).³

ARS' ALLOCATION OF FISCAL YEAR 1996 RESEARCH FUNDS

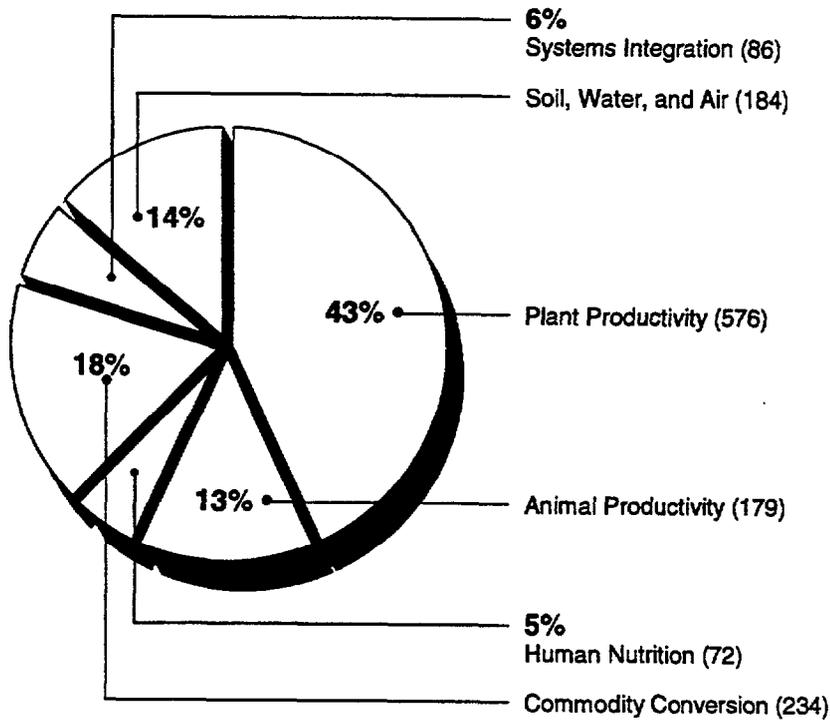
As of January 1996, ARS had allocated \$648 million of its \$710 million fiscal year 1996 research appropriation to 1,198 projects in six discrete research program areas. ARS planned to allocate an additional \$24 million to projects that will start or be renewed later in the fiscal year. The remaining \$38 million of its research appropriation supports the National Agricultural Library, repair and maintenance expenses, and miscellaneous requirements.

ARS' six research program areas are (1) plant productivity; (2) animal productivity; (3) commodity conversion and delivery—research to develop new crops and alternative processing technologies; (4) human nutrition and well-being; (5) soil, water, and air; and (6) systems integration—the integration of knowledge of agricultural production, processing, and marketing into management systems.

³A CRADA is a cooperative agreement between a federal laboratory and a nonfederal entity to conduct specified research or development that is consistent with the mission of the laboratory. The laboratory and nonfederal entity may provide personnel, equipment, or materials, and the nonfederal entity may also provide funds.

As shown in figure 1, the plant productivity research area had the most projects, at about 43 percent of all projects, and the commodity conversion and delivery area had the second largest share, at about 18 percent.

Figure 1: ARS' Fiscal Year 1996 Projects by Research Area

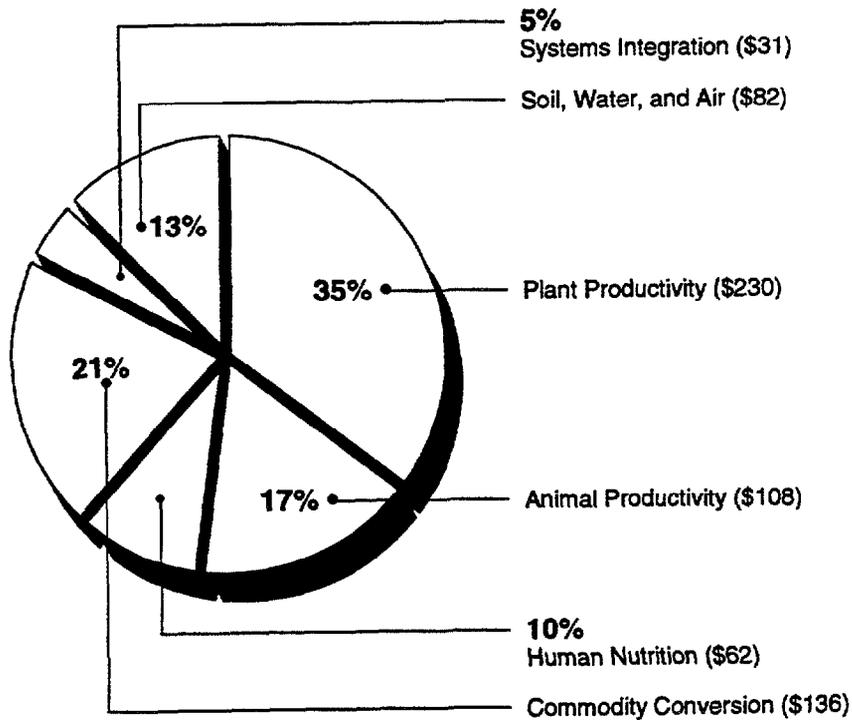


Note: The total number of projects (1,331) shown exceeds the universe of 1,198 projects because some projects contribute to more than one research area.

Source: GAO's analysis of data in ARS' automated Research Management Information System.

As shown in figure 2, the plant productivity research area also received the largest portion of the allocated research funds, at 35 percent (\$230 million), and, again, the commodity conversion and delivery area was second, at 21 percent (\$135 million).

Figure 2: ARS' Fiscal Year 1996 Dollar Allocations by Research Area



Note: The numbers shown do not add to \$648 million because of rounding.

Source: GAO's analysis of data in ARS' automated Research Management Information System.

CHARACTERISTICS OF PROJECTS WITH MOSTLY NONBASIC RESEARCH AND/OR OUTSIDE A HIGH-PRIORITY RESEARCH AREA

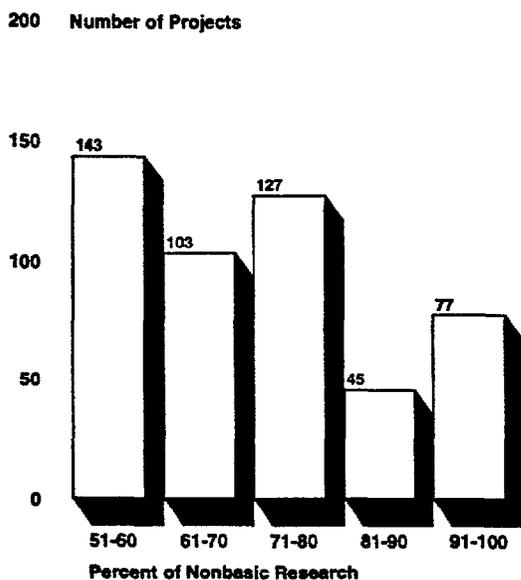
Because of limitations in ARS' available databases, only two of the five characteristics we examined could be linked to ARS' 1,198 ongoing research projects. ARS' Research Management Information System contains information

that enabled us to determine whether a project involved basic or nonbasic research and whether the project was in a high-priority research area as identified by ARS.

Projects That Were Mostly Nonbasic Research

We identified 495 projects (valued at \$257 million) that were mostly (51 percent or more) nonbasic research. Figure 3 shows the number of projects that were mostly nonbasic research, in 10-percent increments, starting at 51-percent nonbasic research.

Figure 3: Number of ARS' Projects With Mostly Nonbasic Research



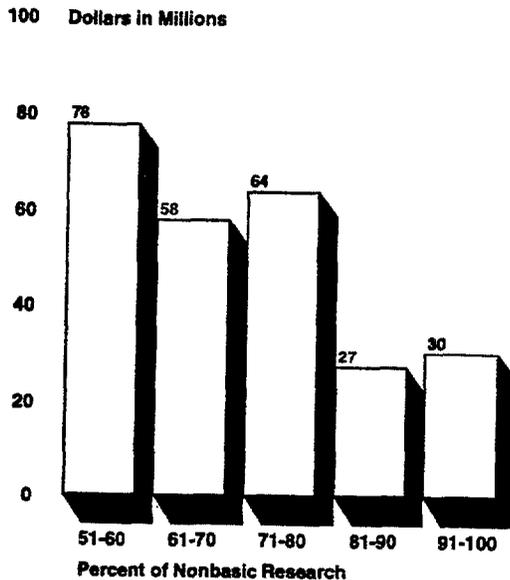
Note: Total is 495 projects.

Source: GAO's analysis of 1,198 projects in ARS' automated Research Management Information System.

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Figure 4 shows the dollars allocated in fiscal year 1996 for those projects with mostly nonbasic research, in 10-percent increments, starting at 51-percent nonbasic research.

Figure 4: Budget of ARS' Projects With Mostly Nonbasic Research



Note: Total is \$257 million.

Source: GAO's analysis of the \$648 million allocated to projects, as shown in ARS' automated Research Management Information System.

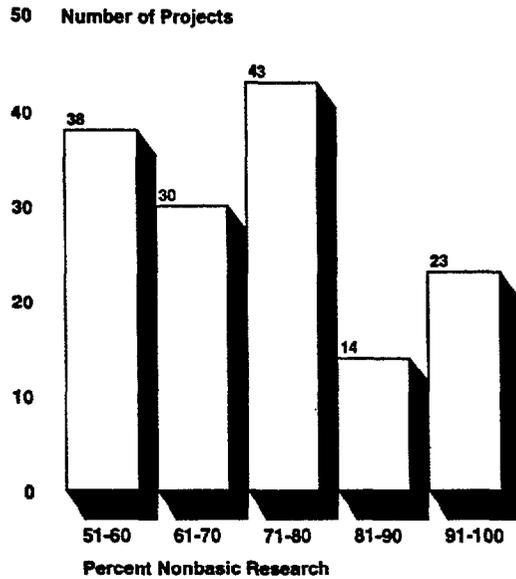
Projects That Were Outside a High-Priority Research Area

According to ARS, all 1,198 of its projects are priority research, but not all projects are in high-priority research areas. High-priority research areas include those designated as such by ARS in its 6-year implementation plan. Using this definition, we identified 432 projects (valued at \$220 million) that were outside a high-priority research area.

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A number of projects involved mostly nonbasic research and were outside a high-priority research area. Figure 5 shows the number of projects (148) that were mostly nonbasic research and outside a high-priority research area, in 10-percent increments, starting at 51-percent nonbasic research.

Figure 5: Number of Mostly Nonbasic Research Projects Outside a High-Priority Research Area



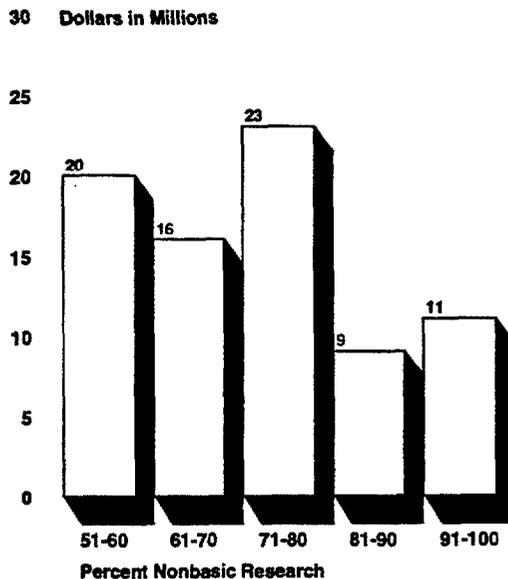
Note: Total is 148 projects.

Source: GAO's analysis of 1,198 projects in ARS' automated Research Management Information System.

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Figure 6 shows the dollars allocated (\$78 million in fiscal year 1996) for those projects that were mostly nonbasic research and outside a high-priority research area, in 10-percent increments, starting at 51-percent nonbasic research.

Figure 6: Budget of Mostly Nonbasic Research Projects Outside a High-Priority Research Area



Note: Total is \$78 million. However, the numbers do not add to this total because of rounding.

Source: GAO's analysis of the \$648 million allocated to projects, as shown in ARS' automated Research Management Information System.

CHARACTERISTICS OF RESEARCH PROJECTS NOT SUBJECT TO PEER REVIEW, WITH IDENTIFIABLE BENEFICIARY, OR PROPOSED FOR DISCONTINUANCE

ARS' Research Management Information System does not contain information on whether a project (1) is subject to peer review, (2) benefits a specific private firm, or (3) has been proposed for termination by ARS. Linking these three characteristics to all projects would have required a detailed review of project files and interviews with research leaders located throughout the country.

Although the peer review, identifiable beneficiary, and proposed termination characteristics could not be linked to the full universe of projects, some projects have one or more of these characteristics, according to ARS' records. Specifically, projects with these three characteristics are the following:

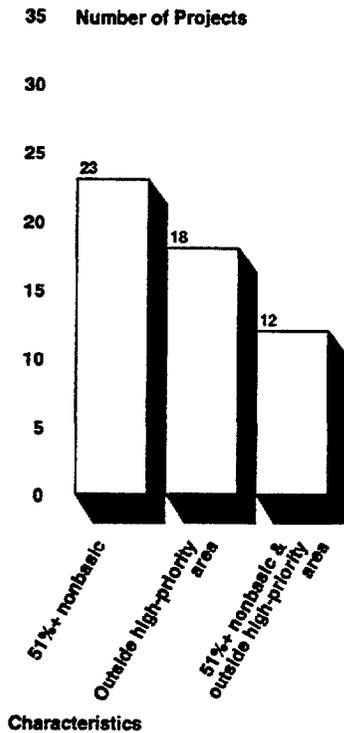
- Projects that are conducted by an external organization, funded via ARS' appropriations, and, among other things, generally not subject to peer review.
- Projects with cooperative research and development agreements between ARS and private institutions, which, because of licensing and other arrangements, benefit specific, identifiable firms.
- Projects that ARS had proposed discontinuing because it deemed them to be of lesser priority than other projects for a variety of reasons, such as the projects' having objectives aimed at primarily local problems.

Projects That Were Not Likely to Be Subject to Peer Review

According to ARS' records, as of January 29, 1996, ARS had 42 projects (valued at \$32 million) that were being conducted by an external organization and funded via ARS' appropriations. ARS officials stated that such externally conducted projects are not likely to be subject to peer review. ARS' project initiation manual requires such reviews for projects performed by ARS scientists.

Figure 7 shows the results of our analysis of the 42 externally conducted projects funded via ARS' appropriations. Twenty-three projects were mostly nonbasic research, 18 were outside a high-priority research area, and 12 were both mostly nonbasic research and outside a high-priority research area.

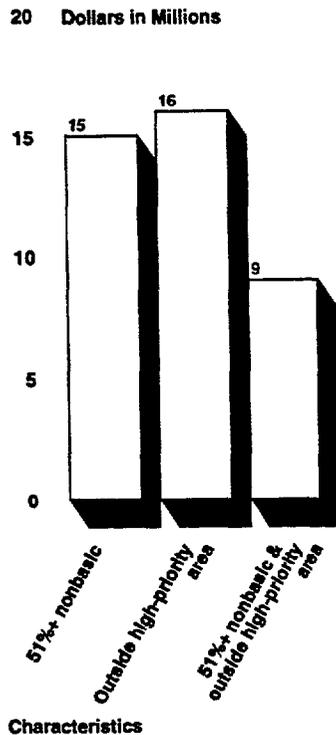
Figure 7: Results of Analysis of Externally Conducted Projects Funded Via ARS' Appropriations--Number of Projects



Source: GAO's analysis of 42 externally conducted projects funded via ARS' appropriations, as shown in ARS' automated Research Management Information System and project files.

Figure 8 shows the dollars allocated for the externally conducted projects funded via ARS' appropriations that were (1) mostly nonbasic research (valued at \$15 million); (2) outside a high-priority research area (valued at \$16 million); and (3) both mostly nonbasic research and outside a high-priority research area (valued at \$9 million).

Figure 8: Results of Analysis of Externally Conducted Projects Funded Via ARS' Appropriations--Dollars Allocated



Source: GAO's analysis of the \$32 million allocated to the 42 projects, as shown in ARS' automated Research Management Information System and project files.

Projects That Have a Specific, Identifiable Beneficiary

CRADAs are one of several mechanisms through which federal laboratories and private industry collaborate on research and development. According to ARS' records, as of January 1996, ARS had at least 236 active CRADAs associated with 173 different projects (valued at \$114 million). The Federal Technology

Transfer Act of 1986 authorized federal agencies to enter into CRADAs with nonfederal cooperators to promote the transfer of commercially useful technologies from federal laboratories to the private sector. More recently, the National Technology Transfer and Advancement Act of 1995 reaffirmed that the federal government can help U.S. businesses to speed the development of new products and processes by entering into CRADAs while leaving the commercialization of technology and industrial innovation in the United States to business. The benefits of CRADAs to ARS include improved opportunities to develop and transfer technology and better feedback from industry on the types of research needed. According to ARS, CRADAs offer participants (1) the first right to exclusive licenses on patented inventions made under the agreement, (2) access to profitable new products and processes, and (3) greater access to ARS' scientists and facilities. A key characteristic of CRADAs is having an identifiable beneficiary.

We reviewed a nongeneralizable sample (i.e., the sample results cannot be projected to the universe of CRADAs) of 40 CRADAs associated with 34 projects. Figure 9 shows that 22 projects involved mostly nonbasic research, 12 projects were outside a high-priority research area, and 7 projects involved mostly nonbasic research and were outside a high-priority research area.⁴ In addition, three projects (valued at \$0.8 million) were not subject to peer review.

⁴Some CRADAs are associated with only part of a project—e.g., just one of several objectives. The dollars shown in this section are the amount ARS allocated for the entire project.

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Figure 9: Results of Analysis of 34 Projects With CRADAs--Number of Projects

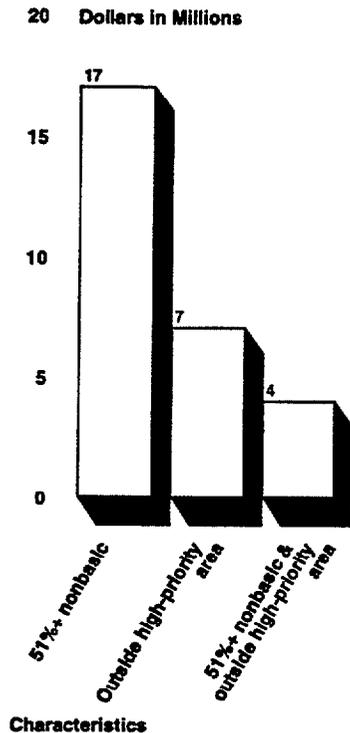


Source: GAO's analysis of project files and comments by ARS research leaders.

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Figure 10 shows the dollars allocated for the projects that were (1) mostly nonbasic research (valued at \$17 million), (2) outside a high-priority research area (valued at \$7 million), and (3) both mostly nonbasic research and outside a high-priority research area (valued at \$4 million).

Figure 10: Results of Analysis of 34 Projects With CRADAs--Dollars Allocated



Source: GAO's analysis of project files and comments by ARS research leaders.

Projects That ARS Proposed Discontinuing

According to ARS officials, ARS proposed discontinuing 50 projects (valued at \$28 million) in its fiscal year 1996 budget request in response to Office of Management and Budget and USDA directions to streamline its program activities. ARS' rationale for discontinuing these projects included the following: (1) The research benefited producers in only one state, (2) the research could be funded by private industry, (3) similar research was being done at other ARS locations, and/or (4) the research objectives had been

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accomplished. ARS officials informed us that, when considering its fiscal year 1996 appropriation, the House and Senate Committees on Appropriations indicated in various reports that ARS should continue funding these projects or these project areas.

The following are examples of projects that ARS proposed discontinuing:

- ARS proposed discontinuing a sugarcane research project because the research was done exclusively to benefit the sugarcane industry in one state.
- ARS proposed discontinuing a pecan germplasm research project aimed at introducing improved pecan varieties because it had already successfully introduced 19 new pecan varieties that are widely grown throughout the pecan belt.
- ARS proposed discontinuing a sustainable farming systems research project for the Northern Great Plains because similar work was being done at four other ARS locations.
- ARS proposed discontinuing a blueberry and cranberry research project because ARS concluded that (1) many of the original research objectives had been met and (2) it would be more appropriate for the industries and the state where these crops are major agricultural industries to conduct the research.

AGENCY COMMENTS

We provided a copy of a draft of this report to the Administrator, ARS, for review and comment. The Assistant Deputy Administrator, National Program Staff, provided ARS' comments. He generally agreed with the factual accuracy of the report and made suggestions for technical revisions, which we incorporated as appropriate.

SCOPE AND METHODOLOGY

To determine the number of projects and budget amount by ARS research program area, we obtained and analyzed funding and other project-related information for each of the 1,198 active projects in ARS' automated Research Management Information System as of January 29, 1996. The system showed the (1) number of projects, (2) dollar amount allocated to each project for fiscal year 1996, and (3) percentage of budget authority assigned to one or two of ARS' research areas. We used this information to identify the dollars allocated

to each major research area.

To determine the number of ongoing research projects that have mostly the characteristics of being nonbasic research and/or outside a high-priority research area, we reviewed ARS' universe of 1,198 projects. First, we analyzed files in ARS' Research Management Information System, as of January 29, 1996, to identify all projects that were mostly nonbasic research, outside a high-priority research area, and mostly nonbasic research and outside a high-priority research area. Each file contains a percentage estimate, generally developed by the ARS project leader, of the type of research (basic, applied, and development) being conducted and various codes that identify whether the project is outside a high-priority research area.

To determine the number of ongoing research projects that have not been subject to peer review, have an identifiable beneficiary, or have been proposed for discontinuance, we reviewed (1) 42 externally conducted projects funded via ARS' appropriations, (2) a nongeneralizable sample of 40 CRADAs associated with 34 projects, and (3) 50 projects that ARS proposed discontinuing.

Specifically, we reviewed the 42 projects for which the Congress directed ARS to provide funding to external institutions and which, according to ARS, were not likely to be subject to peer review. We also determined how many of these projects involved nonbasic research and were outside a high-priority research area. We did not review these projects for the characteristic of having an identifiable beneficiary because the files needed to make this determination were located in different areas throughout the country.

Second, we reviewed a nongeneralizable sample of 40 CRADAs that were associated with 34 projects. For this group of projects, we analyzed the project files to determine if they had any of the five characteristics. We also interviewed the leader of each project.

Third, we reviewed 50 projects that ARS proposed discontinuing in its fiscal year 1996 budget request but that remain active at the direction of the House and/or Senate Committees on Appropriations.

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We conducted our review from October 1995 through May 1996 in accordance with generally accepted government auditing standards.

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If you or your staff have any questions concerning this report, you can reach me on (202) 512-5138.

Sincerely yours,

A handwritten signature in black ink, appearing to read 'R. A. Robinson', written in a cursive style.

Robert A. Robinson
Director, Food and
Agriculture Issues

(150896)

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