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THE AGRICULTURAL ECONOMICS RESEARCH INFORMATION SYSTEM:

CURRENT STATUS AND FUTURE POTENTIALS

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AERIS is the acronym for the agricultural economics research information system. It is a computerized information system for the classification, storage and retrieval of data characterizing the SAES economic research programs (Burbee and Robinson).

The AAEA, indirectly played a critical role in the development of AERIS. A CRIS study committee, established by Ed Schuh, Association President in 1982, and the committee report resulted in the implementation in CRIS of an economics classification scheme. The scheme, provided by the Association, is the basic building block for AERIS. It is the basic component for the organization and characterization of economics research program data and the linkage between CRIS, the parent information system, and AERIS, which is a subsystem or extension of the parent system.

Next, the Davan Priorities study, supported by CSRS, greatly facilitated the development of AERIS. Under the cooperative agreement with Davan Consulting International, CSRS was required to develop a complete inventory of SAES economics research programs using the new classification scheme by the end of 1987. That inventory of 1700 or so economics research projects is the data base for AERIS.

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Moreover, the CSRS recruitment of Clark Burbee with his unique combination of training and background in both agricultural economics and computer science has been a decisive factor in putting AERIS in place.

The objectives of this paper are to discuss: (1) the current status of AERIS, (2) some of the insights gained and the issues raised from the analyses of AERIS data, and (3) the future potentials of AERIS as a research management tool in CSRS and the institutions.

Current Status

At the present time, the 1,700 or so economics research projects underway at the Land Grant Universities (1862) and the SAES have been classified and the planned analyses of data for the Davan report have been completed. In the analytical process, the economics research programs were organized on the basis of administrative regions -- Northeast, Southern, North Central and Western. Paul Farris, in his analysis of marketing economics research programs has organized them on the basis of the 10 production regions (Farris and Robinson).

Excluded from AERIS at this time are data on the economics research programs of the 1890 Institutions and the USDA (ERS, AMS, ACS, FAS, etc.). We eventually want to include departmental research data in AERIS, particularly ERS and examine the issue of research programs complementarities (or competitiveness) and the need for joint planning and coordination. From our perspective, each program tends to go its separate way without much concern or knowledge of what the other is doing in related research.

At the present time AERIS has been used mostly internally within CSRS. The organization has an important accountability function to perform. It must respond to questions and inquiries on the performance of research programs supported with federal funds administered by the organization. It must also respond to questions and inquiries about the use of these funds by individual departments, by individual institutions, by regional groups of institutions and for the entire system. AERIS has been designed primarily to answer input questions (use of funds) rather than output (performance or productivity) although, as will be discussed later the system has the potential for being expanded to deal with the latter type questions. Finally there are no data in AERIS from the institutions' teaching and extension programs.

Although AERIS can answer innumerable questions, the following are some of the basic ones that can be answered for individual departments, for individual stations, for regional groupings of stations by a number of configurations and or the the entire system:

- * At what levels are agricultural economics research programs funded?
- * Where do the funds come from that support these programs? There are two major funding categories -- federal and nonfederal. Within the federal category there seven funding sources and within the nonfederal there are four.
- * How are the funds allocated among the different subfields of agricultural economics research? In the AAEA classification scheme implemented in CRIS, the major field economics research (2630) has been divided into 11 separate subfields.

- * What are the relationships between funding sources and subfields of agricultural economics research? For example, what are the sources of funding for production economics/farm management research and the amount of funding from each specific source? The same questions can be answered for any of the subfields of economics research.
- * How do economics research programs compare with respect to funding levels, funding sources, and allocation patterns?

Some Insights Gained and Issues Raised

In our program analyses using AERIS data, we have gained certain insights into the Stations' economics research programs that we would not otherwise have been aware of. The first is the rather substantial gaps in CRIS data. As we have presented the results of our analyses to various department head groups and compared actual departmental research expenditure data to AERIS data derived from CRIS, there have in some instances been substantial disparities between the two. In those cases where there are disparities, the CRIS data are always lower than the actual departmental data. Also, these disparities usually occur more frequently in larger departments than in smaller ones. Apparently, some departments are receiving substantial amounts of research funds that either by-pass the Stations' accounting system or are not reported to CRIS. This is an issue to be addressed by the Station Directors, CSRS Administrators and the CRIS Policy Committee. If there are disparities in the expenditure data for economics research programs, then there may be disparities in other disciplinary research programs. Dealing with this issue obviously requires a survey to determine the aggregate extent of these disparities,

the reasons they exist, and the appropriate policies and procedures to correct them. It is unlikely that the agricultural economics staff will attempt a survey to obtain any primary data on department research expenditures.

Another insight we have gained from the analysis of AERIS data is what we are referring to as competitiveness. It is a relative term and refers to the percentage of total research funds that a department receives from soft funds (grants) compared to the Station where the department is located and compared to other departments in the same region. Implied in the term is some degree of initiative or aggression to seek soft funding. There is a substantial amount of variation in competitiveness. The percentage of funds from soft funding sources received by some departments substantially exceeded the percentage received by the Station and of course the reverse was also true. There was also a substantial variation among departments within the same region on this basis. We understand very little why some stations and departments are successful in obtaining soft funding while others are less successful. Institutional policies and incentives appear to be important factors.

The funding source in CRIS classified as other nonfederal is not defined. We have assumed it includes funds from local and state agencies and foundations, since they are not covered in other categories. Although, this funding source is relatively small at the present time, it is one of the fastest growing sources of support for economics research in the SAES. Our tentative explanation is that the 9 month appointment leads researchers to pursue grants from state and local agencies and to a lesser extent foundations in order to supplement salaries.

Another finding was the emergence of substantial economics research programs in what we refer to as non-traditional departments. Apparently, the growth in these programs has been substantial in recent years. In some cases these programs were nearly as large as the ones in the traditional departments. Of course, non-traditional is a collective term and encompasses economics research programs in several departments while traditional department refers to a single department program. The traditional department is the major department on campus, regardless of the title, that conducts agricultural economics research, teaching and extension programs. Non traditional refers to all other departments on campus that conduct economics research supported by Station administered funds. We have not made an analysis of the other departments conducting economics research, but find in our limited examination that forestry, natural resources, and production departments (animal and plant sciences) are included. In those cases where there are substantial economics programs in non-traditional departments, the issue of the planning and coordination of research to achieve the most effective use of total resources is raised. Incidentally, the CSRS review largely concentrates on the research programs in traditional departments, ignoring for the most part related economics research programs in non-traditional departments underway on the same campus.

There was no federal funding of station economics research programs from competitive grants in 1985 (AERIS base year) and only a small percentage of funding from special grants. Total federal funding from special grants has increased substantially in recent years. Agricultural

economics research has benefited from total program growth, not necessarily as a percentage of the total.

The federal funding of SAES research programs from CSRS Administered sources has taken on some particular characteristics in recent years that substantially impacts specific departments. CSRS administers two types of federal funds -- formula and grant. Formula funds, primarily Hatch and McIntire Stennis, have remained almost constant while grants funds have increased substantially. Grants are of two types -- competitive and special. The competitive grants program is largely directed to basic research in the biological sciences. These grants are indeed competitive and are awarded on the basis of peer panel evaluations. On the other hand some of the special grants are awarded on a competitive basis (that is peer reviewed), but increasing amounts are awarded without peer review. The federal funding of the policy research at four institution and the funding of the International Trade Development Centers are non competitive. In such cases the Congress targets the institutions and the types of programs for support. In such cases, CSRS essentially acts as a pass-thru agency and carries out the administrative details in awarding the grant. It also carries out an accountability function and must respond to questions and inquiries about performance and the use of funds under each grant. The grants are made by Congress and negotiated by each State's congressional delegation and the institution. Some agricultural economics departments have been very active in pursuing and successful in receiving special grants. Also it should be recognized that many national needs as perceived by Congress at the present time are in the area of economics and, therefore, agricultural economists have a some advantage in obtaining these

grants. If the relative decline in formula funds and the increase in grant funds continues, we see major impacts on agricultural economics research programs and secondary impacts on their teaching and extensions programs. First, we see a reorientation of department research programs to national needs or problems. Secondly, there could be greater differences in rates of growth among departments.

Potential Future Uses of AERIS

In CSRS. Changes in CSRS as an organization, including staffing patterns, will inevitably create greater pressures for the expanded use of computer and information technologies in fulfilling the agency's mission. We see AERIS and the analysis of economics research programs as a beginning which may serve as a prototype for other disciplinary groups in the organization.

Two major external developments have created these changes in the organization. One is the increasing proliferation of federal legislation, that provides increasing levels of grant support for the institutions while the second was the reduction in force (RIF) the organization experienced in 1982. Appendix tables 1 and 2 show the levels and sources of federal funding for institutional research administered by CSRS from 1955 to 1988. From 1955 to 1963, nearly all funds administered by CSRS were from Hatch. Starting near the mid-1960's new legislation began to emerge, which have grown steadily over the years. While in 1963, nearly all funds administered by CSRS came from Hatch, only about 65% came from this source in 1988. This trend is expected to continue as Hatch funds are held nearly constant and additional funding of institutional research is derived from

other sources. While Hatch funds are allocated to the institutions on a formula basis, new funds tend to be administered on a project basis. Project or grants management requires much greater documentation and information processing and hence creates greater pressures for accountability both input (use of funds) and output (performance). Computerized information system and program analysis are the major tools for effectively managing grants programs, particularly with a substantially reduced science staff in the organization.

The RIF in 1982 compounded the need for information systems in carrying out the accountability and coordination functions of the organization. As a result of the RIF, the science staff in the organization was reduced about 50%, from about 40 to 20 professionals. While there has been a substantial increase in CSRS personnel since 1982, this growth has occurred in non-science personnel. There has been essentially no growth in science positions in recent years nor are any expected in the foreseeable future. While the above appears extraneous, it does describe the environment in which the agricultural economists must operate in CSRS and the resource constraints. In view of this our plans for the future development and use of AERIS are rather modest.

We would like to include data on the economics research programs of the 1890 Institutions and the USDA (ERS, AMS, ACS, FAS, etc.). As previously stated, we want to examine the issue of Station-USDA economics research program complementarities (or competitiveness) and the need for joint planning and coordination. From our perspective, each program tends to go its separate way without much concern or knowledge of what the other is doing in related research.

We may also try different groupings of data, perhaps by the 10 farm production regions to examine the relationships between the use of funds and the nature of agriculture and rural problems in the respective regions. The four major administrative regions that are currently used tends to diffuse these relationships.

After a sufficient lapse of time, we will include another year's data (perhaps 1987) which will allow analysis of economics research program shifts over time. Also, we can examine growth rates in departmental research programs and possibly explain the differences. New federal funding mechanisms, as already stated, may have a substantial impacts on the use of funds and departmental growth rates.

By the Institutions. AERIS data are available to the institutions and departments of agricultural economics upon request. Any department can compare its research program to any other in the entire Experiment Station System. These comparisons would include funding levels, funding sources, and allocation patterns.

The Department Chair groups in the North Central and Northeast regions have discussed the need for the development and maintenance of data sets characterizing the research, teaching, and extension programs of departments in the respective regions. Scott and Shapiro have developed a computer software program for that purpose. Also, a set of key data that may be useful in departmental management is included as Attachment A. The data are grouped by input (personnel and financial resources), outputs (publications, student credit hours taught, etc.,) and productivity indicators. In our judgment, the development and maintenance of computerized management information systems would be useful in departmental

administration and decision-making. If developed, AERIS could be a useful addition to such a system.

In summary, AERIS has proved to be an important tool for agricultural economists in CSRS. With limited personnel and expanding research programs, it has been an efficient system for analyzing, tracking and monitoring economics research programs supported in total or part by federal funds administered by the organization. It has been particularly useful in answering questions and responding to inquiries about these programs in a short period of time. The program analyses have been well received by Station administrators and researchers. Plans are to develop the system further, but again with emphasis on internal information needs.

The further development of the system in response to institution needs will depend a great deal on the information needs expressed by Station directors, department chairs, and agricultural economists.

References

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Appendix Table 1. COOPERATIVE STATE RESEARCH SERVICE
 APPROPRIATION HISTORY
 1981-1988
 (In thousands of dollars)

FY	Total Appropriation	Hatch Act (Includes Penalty Mail)	McIntire- Stennis Coop. Forestry Research	1890 Insti- tutions and Tuskegee	1890 Res. Faci- lities	Special Res. Grants	Comp. Res. Grants	Animal Health & Disease (Sec. 1433, PL 95-113)	Alcohol Fuels Sec. 1419, PL 95- 113	Native Latex Act as amended (PL 95- 592)	Range- land Res. Grants (Sec 1480 (PL 97-98)	Fed. Admin (Direct Appro.)	Forestry Compet- itive Grants	Res. Faci- lities Act	Aquaculture Centers Sec.1475 PL 95- 113	Other Res. Grants Sec. 1472 PL 95- 113	Higher Education			
																	Strengthen- ing Grants	Train- ing Grants	Morrill- Nelson	
1988	\$240,270 ^{b/}	\$155,545	\$12,975	\$23,333	--	--	\$44,500	--	--	--	--	\$1,917	--	--	--	--	--	\$2,000	--	--
1987	307,873	148,792	12,412	22,320	\$9,508	\$28,037	40,651	\$5,476	--	\$20,368	\$475	2,630	\$4,500	\$2,000	\$3,000	\$150	--	1,902	\$2,852	\$2,800
1986	285,452	148,792	12,412	22,320	9,508	27,389	42,312	5,476	--	1,143	475	1,565	6,506	--	--	--	--	1,902	2,852	2,800
1985	304,316	156,484	13,053	23,474	10,000	32,028	46,000	5,760	--	702	500	1,475	7,840	--	--	--	--	2,000	5,000	--
1984	247,655	152,281	12,702	22,844	10,000	25,234	17,000	5,760	\$540	702	--	592	--	--	--	--	--	--	--	--
1983	244,966	149,295	12,452	22,394	10,000	26,533	17,000	5,760	540	702	--	290 ^{a/}	--	--	--	--	--	--	--	--
1982	221,216	141,109	12,031	21,492	--	21,899	16,320	5,760	540	702	--	1,363	--	--	--	--	--	--	--	--
1981	200,897	128,615	10,774	19,270	--	17,076	16,000	6,500	500	650	--	1,512	--	--	--	--	--	--	--	--

a/ Includes transfer to Office of the Secretary, \$17,000.

b/ Based on 1988 President's Budget.

Appendix Table 2. COOPERATIVE STATE RESEARCH SERVICE
 APPROPRIATION HISTORY,
 1955-1980
 (In thousands of dollars)

Fiscal Year	Total Appropriation	Hatch Act (Includes Penalty Mail)	McIntire-Stennis Cooperative Forestry Research	1890 Institutions and Tuskegee	Special Research Grants	Competitive Research Grants	Title V, Rural Development Act	Animal Health & Disease (Sec. 1433, PL 95-113)	Alcohol Fuels (Sec. 1419, PL 95-113)	Native Latex Act, as amended (PL 95-592)	Facilities	Agric. Marketing Section 204(b)	Federal Admin (Direct Appro.)
1980	\$186,031 7/	\$118,566	\$10,000	\$17,785	\$14,048 7/	\$15,500 7/	\$1,500	\$6,000	\$500	\$650	--	--	\$1,482 7/
1979	174,395	109,066	9,500	16,360 6/	15,773	15,000	1,500	5,000	500	--	--	--	1,696
1978	143,150 5/	109,066	9,500	14,153	7,235	4/	1,500	--	--	--	--	--	1,696 5/
1977	129,022	97,973	8,212	13,352	6,310	--	1,500	--	--	--	--	--	1,675
Trans. Qtr.	28,615	21,234	1,866	3,176	1,710	--	375	--	--	--	--	--	254
1976	114,460	84,934	7,462	12,706	6,840	--	1,500	--	--	--	--	--	1,018
1975	101,749	77,036	7,070	11,824	3,400	--	1,500	--	--	--	--	--	919
1974	90,105 3/	70,104	6,203	10,883	700	--	1,500	--	--	--	--	--	715 3/
1973	91,438	69,104	6,444	10,883	4,517	--	--	--	--	--	--	--	490
1972	82,948	65,139	4,672	8,883	3,617	--	--	--	--	--	--	--	637
1971	69,533	61,550	4,412	283	2,717	--	--	--	--	--	--	--	571
1970	62,640	55,349	3,785	283	1,717	--	--	--	--	--	\$1,000	--	506
1969	58,911 2/	53,050 2/	3,485	283	1,717	--	--	--	--	--	--	--	376 2/
1968	58,958 1/	51,423 1/	3,370 1/	283	1,517 1/	--	--	--	--	--	2,000	--	365 1/
1967	58,776	51,423	3,000	283	1,717	--	--	--	--	--	2,000	--	353
1966	54,827	48,423	2,500	--	1,600	--	--	--	--	--	2,000	--	304
1965	49,999	45,423	1,000	--	--	--	--	--	--	--	3,242	--	334
1964	41,633	39,673	1,000	--	--	--	--	--	--	--	--	\$500	460
1963	38,263	37,363	--	--	--	--	--	--	--	--	--	500	400
1962	36,207	35,303	--	--	--	--	--	--	--	--	--	500	404
1961	33,207	32,303	--	--	--	--	--	--	--	--	--	500	404
1960	32,131	31,304	--	--	--	--	--	--	--	--	--	500	327
1959	32,135	31,304	--	--	--	--	--	--	--	--	--	500	331
1958	30,869	30,104	--	--	--	--	--	--	--	--	--	500	265
1957	29,965	29,254	--	--	--	--	--	--	--	--	--	500	211
1956	24,911	24,254	--	--	--	--	--	--	--	--	--	500	157
1955	19,595	18,954	--	--	--	--	--	--	--	--	--	500	141

- 1/ Excludes FY 1968 funds placed in reserve under P.L. 90-218 and 90-392: \$3,852,000 Hatch Act; \$115,000 McIntire-Stennis; \$200,000 Special Research Grants; \$33,000 Federal administration (direct appro.).
- 2/ Excludes FY 1969 funds placed in reserve under P.L. 90-364: \$205,000 Hatch Act; \$70,000 Federal administration (direct appro.).
- 3/ Includes transfer from ASCS for increased pay costs (\$148,000) and from OMS for Information Services (\$77,300).
- 4/ \$15,000,000 was appropriated to the Agricultural Research Service in FY 1978 for Competitive Research Grants.
- 5/ Includes transfer to Office of Secretary \$2,164.
- 6/ Beginning in fiscal year 1979, funds were appropriated under section 1445 of P.L. 95-113; 1967-1978 funds available under P.L. 89-106.
- 7/ Excludes funds rescinded in FY 1980 under P.L. 96-304: \$2.5 million special research grants for high priority agricultural research; \$500,000 competitive research grants; \$14,000 Federal administration (direct appropriation).

ATTACHMENT A
KEY DATA ITEMS TO BE INCLUDED IN AN
AGRICULTURAL INFORMATION SYSTEM

A. Personnel

1. Number of faculty -- research, teaching, extension, and total
2. Number of faculty -- professor, associate professor, assistant professor, instructor, and total
3. Number of post doctorals -- total
4. Number of other staff or support personnel -- research, teaching, extension, and total
5. Number of graduate assistants -- total

B. Financial Resources and Program

1. Funds -- federal appropriations, state appropriations, grants and contracts, and total distributed among:
 - a. Functions -- research, extension, teaching, and total
 - b. Subject matter areas (would need to specify the areas in order to have a common base)
2. Operating funds per faculty FTE - research, teaching, extension, and total
3. Faculty salaries -- high, low, and mean by professor, associate professor, and assistant professor
4. Number of graduate assistantships available -- total
5. Assistantship stipends -- M.S. and Ph.D.
6. Number of majors at the undergraduate level -- total

7. Number of majors at the M.S. level -- domestic, foreign, and total
8. Number of majors at the Ph.D. level -- domestic, foreign, and total

C. Outputs

(These would be better if broken down by academic rank and subject matter area, but this is probably too much to expect, at least initially)

1. Publications
 - a. Books, chapters in books, articles in refereed professional journals, and research bulletins
 - b. Extension publications
 - c. Other publications
2. Oral presentations on TV, radio, at workshops or training sessions, before clientele groups, etc.
3. Videotapes prepared for clientele groups, students or other professionals; computer programs or software developed
4. Student credit hours taught -- undergraduate level, graduate level, and total
5. Number of degrees awarded -- B.S., M.S., Ph.D., and total

D. Productivity

1. Research publications per research FTE
2. Extension publications per extension FTE
3. Oral presentations per total FTE

78

4. Videotape and computer programs per total FTE
5. Total student credit hours taught per teaching FTE
6. Dollar costs per total student credit hour taught