

A DESCRIPTIVE AND ECONOMIC ANALYSIS OF AGRICULTURAL  
TEACHER EDUCATION PROGRAMS IN LAND-GRANT  
UNIVERSITIES OF THE NORTH-CENTRAL REGION

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*Introduction*

Agricultural education programs can be viewed from an economic input-output model where resources are supplied to the model as inputs and the end result of the process is outputs. Resources used as inputs include human resources (faculty and staff) and capital resources (funding for salaries, operating and overhead expenses), and lastly, the "physical plant" of the university, that is, classrooms, laboratories, library, and the like.

With high rates of inflation, increasing operating costs, and tighter budgets, administrators of agricultural education programs need to identify and analyze more closely the input/output process to make it as efficient as possible.

*Purpose and Data*

The purpose of this study was to assess the inputs and outputs of the agricultural education programs of land-grant universities in the North-Central region. Data from each individual department were collected for the 1978-1979 fiscal year. The source of data is from a survey of the agricultural education departments in the North-Central region. Data were analyzed to determine the resources used in the programs, quantify inputs/outputs, and compare differences and similarities of programs.

The departmental executive officer for each agricultural education department was mailed a survey in late 1979 requesting data about their respective department and program. Twelve questionnaires were mailed and responses were received from eight departments for a 66.7% completion rate.

## *Findings*

Information was collected from each departmental executive officer (DEO) on the general structure and affiliation of the department or section, funding of the department including sources and amounts, faculty and staff time utilization, faculty salaries, and outputs from the departments, including the number of students enrolled, number of graduates and placement patterns.

### *Organizational Structure*

One-half of the programs were organized as a department within a college while the others were a section within a department. Organizational structure did not affect identity as each department retained its own identity even though its funding may have been a part of a larger budget or program. There is no uniformity among departments on college affiliation. Some are affiliated with Colleges of Agriculture while others are affiliated with Colleges of Education. However, organizational structure was correlated with college affiliation. Those curricula organized as departments tended to be closely aligned to Colleges of Agriculture, while those programs organized as sections tended to be affiliated with Colleges of Education. Under either organizational method, faculty members frequently held joint appointments in both colleges.

### *Degree Programs*

All of the departments offered a bachelor of science degree for undergraduate students. But beyond that point, degree programs were not homogeneous. Advanced degree programs were available from most departments, with 50% of the departments offering either a M.A. or M.S. in agricultural education. Two departments offered a Ph.D. degree in Agricultural Education and four departments offered a Ph.D. degree in Education with special emphasis in agricultural education.

### *Output Factors and Their Measurement*

Output factors identified included undergraduate and graduate student enrollment, number of graduates, semester credit hours taught during the 1978-1979 academic year, and semester credit contact hours.

Since a primary mission of the undergraduate program is the placement of graduates in secondary schools, an important output factor is the number of graduates and the placement pattern of these graduates. For the 1978-1979 academic year, the study departments collectively graduated 275 students and placed 59.6% (164 graduates) in secondary school teaching positions.

Two additional statistics were used to measure the output of the departments. DEOs listed the undergraduate and graduate courses taught and the enrollment for each course. All data were converted to a semester equivalent and the number of semester credit contact hours were calculated.

For the undergraduate program, the number of semester credits varied from 24 to 69 credits with a mean of 45.1 per department. The number of semester contact hours varied from 331 to 1,254 semester credit hours. The number of semester contact hours was determined by multiplying the number of semester credits for a particular course by the number of students completing the course. The mean number of semester contact hours at the undergraduate level was 820 contact hours.

#### *Input Factors and Their Measurement*

Economic input factors are represented by capital in terms of salaries paid and overhead expenses and labor in terms of faculty/staff time. Data collected from the DEOs were aggregated and means calculated for several input factors.

*Faculty and staff time utilization.* An important resource to the agricultural education program is the faculty and staff. Data were collected on time utilization for all professional faculty, graduate teaching, and research assistants for the 1978-1979 year. Support staff such as secretarial or clerical staff were excluded. Respondents indicated the employment base and academic rank for each staff member and all data were converted to full-time equivalents and aggregated by department. A full-time equivalent was defined as one faculty member employed full-time and working for a full calendar year, excluding annual leave and other similar activities.

As shown in Table 1, the undergraduate teaching/advising program ranked first in time consumed by the departments. It accounted for 36.1% of the total time with a mean of 2.28 FTEs/department. The research program ranked second in time resources utilized. Approximately 10% less time is spent on research compared to the undergraduate teaching/advising program. Twenty-six percent or 1.69 FTEs/department is spent on research.

The graduate teaching and inservice/Extension components ranked a distant third and fourth. In fact, their combined total is almost equal to the time resources devoted to research. Slightly more than 15% and 10% of the time is spent on graduate teaching and inservice/Extension programs, respectively.

Table 1

DISTRIBUTION OF FACULTY/STAFF TIME IN  
FULLTIME EQUIVALENTS BY MAJOR FUNCTION, 1978-1979.

Program Function	Mean Dept. (FTE)	Percent of Total	Range in FTEs
Undergraduate teaching/ advising	2.28	36.1%	1.57 to 3.25
Graduate teaching	.96	15.1	.48 to 1.65
Research	1.69	26.7	.15 to 3.60
In-Service/Extension	.64	10.1	.20 to 1.35
Administration	.48	7.6	.15 to 1.20
Other	.28	4.4	.01 to 1.50
Total	6.33 <sup>a</sup>		

<sup>a</sup>The number of full-time equivalents (FTEs) for the individual departments varied from 3.0 to 11.0 FTEs. For the 1978-1979 year, there were a total of 50.6 full-time equivalents employed in the eight study departments.

*Faculty and staff salaries.* Each DEO listed faculty/staff salaries including fringe benefits paid by the University. Faculty members were coded by number to retain their anonymity. Salaries were then distributed by individual faculty member according to the time spent within a particular function. Table 2 contains the results.

Table 2

DISTRIBUTION OF FACULTY/STAFF SALARIES  
BY MAJOR FUNCTIONAL AREA, 1978-1979.

Program Function	Salaries/ Department	Percent of Total	Range in Total Salaries
Undergrad. teaching	\$56,398	37.3%	\$35,910 to 105,440
Graduate teaching	26,289	17.4	5,882 to 44,600
Research	29,292	19.4	3,287 to 49,225
Inservice/Extension	17,071	11.2	0 to 39,830
Administration	16,734	11.1	3,682 to 48,885
Others	5,434	3.6	0 to 29,630
Total	\$151,218	100.0	

Total salaries and fringe benefits averaged more than \$150,000 per department or over \$1.2 million for the eight departments. The undergraduate teaching program required the largest amount of salaries, amounting to 37.3% of the total graduate teaching and nearly twice the amount spent on research. The salaries paid for research ranked second with nearly 20 percent of all salaries paid. It should be noted that some departments showed no salaries paid for inservice/Extension and other activities because these departments reported no time spent in these areas.

*Comparison of faculty/staff time versus salary.* Figure 1 shows the comparison of time and salaries for all faculty and staff in the study departments. The percentage of faculty/staff time is fairly comparable to the salaries paid for the undergraduate teaching and inservice/Extension programs. The undergraduate teaching/advising program required 36.1 percent of the time and used 37.3 percent of the money resources. Similarly, the inservice/Extension component showed consistency between time and salaries. However, a larger disparity is noted for the other major functional areas.

For the graduate teaching program and administrative function, the percentage of salaries paid exceeds the percentage of time spent by more than two percentage points. The opposite is true for the research function. There is a plausible explanation for both of these phenomena. First, many graduate courses are taught by more highly paid and tenured professors. The same is true for the administrator who is frequently the highest paid faculty member in the department and devotes most or all of his/her time to administering the program.

For the research program, the salaries paid to the research staff include faculty and graduate assistants. Graduate assistants are usually the lowest paid staff members who devote a large amount of time to research. Hence, research program costs relative to time do not follow the same proportional trend.

#### *Input/Output Ratios*

In previous sections, program output data were presented and inputs for the study departments measured by functional area. This section combines some of the data in terms of input/output ratios.

*Faculty/staff salary cost per FTE.* An important cost ratio used to compare departments and functions within departments is the faculty-staff salary cost per full-time equivalent (FTE). Faculty/staff salary cost/FTE is a ratio of total salaries to the total FTEs. These data are reported in Table 3.

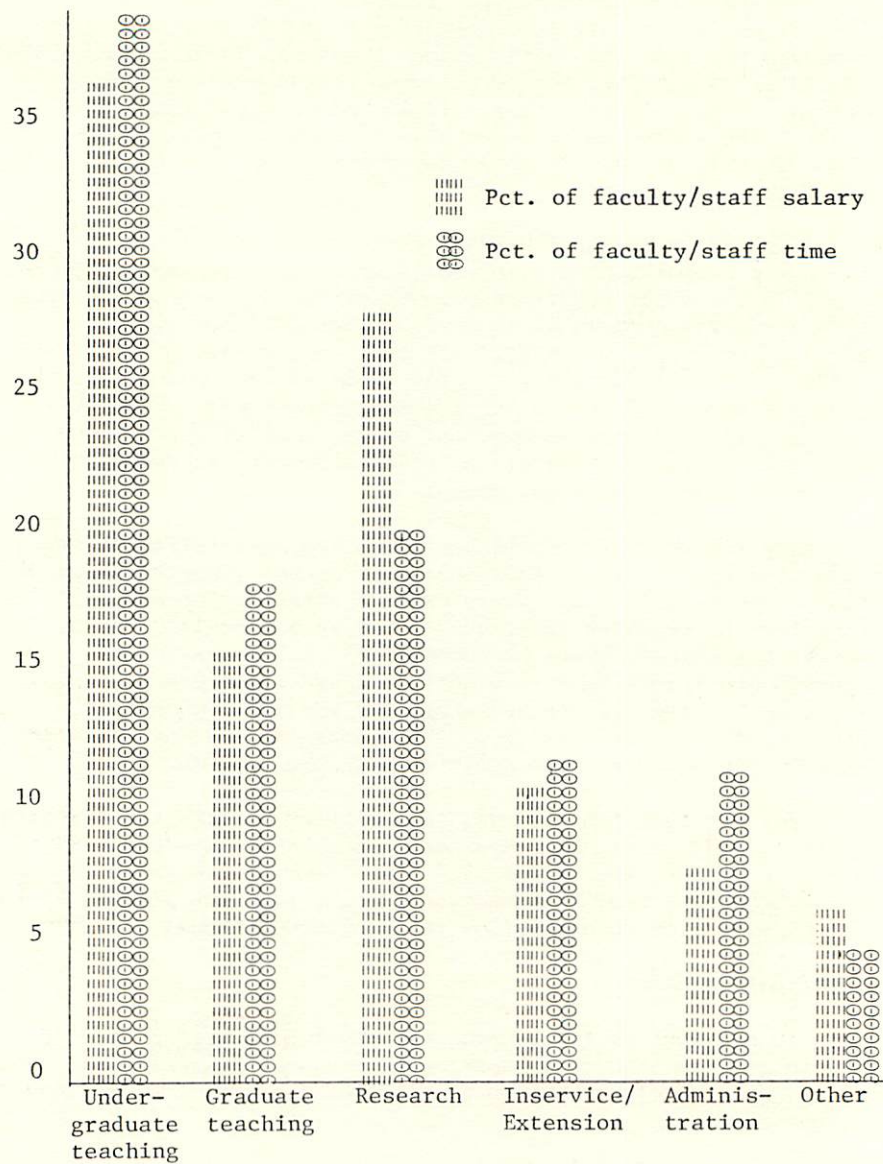


Figure 1. Comparison of faculty/staff time to salary by major functional area for study departments, 1978-1979.

Table 3

FACULTY/STAFF SALARIES PER FTE  
BY PROGRAM FUNCTION, 1978-1979.

Program Function	Faculty/Staff Salary per FTE	Range
Undergraduate teaching	\$24,735	\$20,228 to 32,443
Graduate teaching	27,393	21,541 to 32,593
Research	17,332	9,868 to 28,816
Inservice/Extension	26,673	0 to 36,541
Administration	34,862	24,547 to 39,200
Other	19,407	0 to 26,252
All Functions	23,889	18,517 to 32,098

For all functions, the mean salary cost per FTE was nearly \$24,000. Salary costs per FTE were the lowest for research and the highest for administration. The graduate teaching program ranked second followed by the inservice/Extension education program. These costs were fairly comparable. If program administration costs are excluded from the analysis, the range in mean salary costs per FTE narrows from \$17,332 (research) to \$27,393 (graduate teaching), or a difference of 36%.

*Semester Credits Per FTE  
And Salary Cost Per Semester Credit Hour.*

Comparisons between the number of semester credits per FTE (undergraduate and graduate) and the cost per semester credit are shown in Table 4.

Undergraduate semester credits per FTE is an indication of the teaching load for the faculty in the department and varied from 13.9 to 35.7 credits (156% variation), with a mean of 19.6 credits per FTE per year. Even though the variance was large, most departments clustered around 14 to 17 credits per FTE.

The number of graduate credits per FTE includes graduate classroom teaching, special problems, and graduate research credits. The number of graduate credits varied from 25.9 to 62.5 credits per FTE, with a mean of 41.4. The mean for graduate credits per FTE is more than twice the credits per FTE for the undergraduate program. This can be explained by the fact that much of the graduate program consists of graduate research

credits supervised by a tenured professor. Special problems and research credits often comprise a large portion of the total graduate program and are under the supervision of the graduate faculty member who may be supervising several students at the same time. Lastly, graduate classes tend to be smaller.

Salary cost per semester credit hour is calculated by taking faculty/staff salaries allocated to a function and dividing by the number of semester credit hours, where the number of semester credit hours is the number of semester credits times the number of students completing the course. This calculation does not reflect the total educational cost to a university but is an indication only of salary costs. From Table 4, it is apparent that little difference exists in the salary cost per semester credit hour when comparing undergraduate and graduate programs. Both costs are from \$70 to \$80 per credit hour. However, a wider range existed for the undergraduate program.

Table 4  
SEMESTER CREDITS PER FTE  
AND SALARY COST PER SEMESTER CREDIT, 1978-1979.

Function	Mean	Range
Semester credit per FTE		
Undergraduate program	19.6	13.9 to 35.7
Graduate program	41.4	25.9 to 62.5
Salary cost per semester credit hour		
Undergraduate program	\$71.09	\$39.46 to 110.00
Graduate program	75.59	53.73 to 115.02

#### *DEOs' Perception of Resource Management*

The DEOs were polled to indicate how they perceived their departmental output-inputs and how they would alter their mix under different situations. Three different situations are described and the results are listed in Table 5.

*Situation 1.* Under Situation 1, the DEOs were asked to indicate the perceived proportion of resources for each major functional area. Nearly 50% of the perceived inputs are devoted to the undergraduate program, as shown in Situation 1,



Table 5. Graduate programs were second with slightly less than one-fourth of the inputs used for this function. Comparing these data to the actual time spent, as noted in Table 1, the DEOs perceived that more time resources were being used in the undergraduate program than actually existed. The same is true for salaries, as noted in Table 2. A similar situation existed for the graduate teaching function. The DEOs perceived that 23% of the resources were being used for this area while the actual data show less than that amount. However, the opposite is true for the research program because the actual mix of resources exceeded the perceived mix of resources. This would indicate that more research is being conducted than perceived.

Table 5  
 PERCENTAGE OF TIME SPENT BY MAJOR FUNCTION  
 UNDER THREE DIFFERENT SITUATIONS.

	Percentage of Staff Time Spent		
	Situation 1	Situation 2	Situation 3
Undergraduate teaching	48.8%	48.8%	43.8%
Graduate teaching	23.1	21.0	22.5
Research	14.4	17.5	20.0
Inservice/Extension	13.7	12.7	13.8

*Situation 2.* In this case, the DEOs were asked to alter the resource use to achieve greater productivity and assume that no additional resources would be available. Specifically, how would the resource mix be changed to improve productivity? Productivity was not defined, but could have meant more students, more research projects, or materials development. The results indicate that more resources should be devoted to research relative to other areas, indicating a desire to improve the quantity of research conducted. Resources would have been diverted from the graduate teaching and inservice/Extension areas.

*Situation 3.* Situation 3 allows the DEOs to allocate resources, provided unlimited resources are available. In this case even more emphasis is placed upon research, expanding by more than 5%, as compared to Situation 1. Undergraduate teaching resources would decrease by nearly the same percentage, while graduate teaching and inservice would remain virtually unchanged.

### *Summary and Conclusions*

From the study it was found that the programs in the North-Central region are fairly homogeneous, particularly at the undergraduate level. All offered a Bachelor of Science degree in Agricultural Education with training for secondary school teaching. Greater diversity existed in the graduate programs.

Faculty and staff utilization for the departments reveals that more than one-third of all staff time is used to support the undergraduate program. This required approximately 2.28 full-time equivalents per department. Salaries and fringe benefits to support the undergraduate program amounted to 37.3%, which is about the same as the time utilization.

The graduate teaching program required less staff time and fewer dollars with approximately 15% of staff time and 17% of all salaries used to support this function. Costs per FTE were higher than for the undergraduate program.

The research program was the second largest user of staff time but had the lowest salary cost per FTE because of the emphasis of research being done by graduate assistants.

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(Russell, continued from page 7)

such a change at the Federal level to the state level would be potentially harmful, if not deadly.

In conclusion, vocational agriculture should be administered through the U.S. Department of Education. Our mission lies in education. Our substance lies in the development of people. The most effective administration of our programs lies in our state departments of education and with the other educational programs of the U.S. Department of Education. Philosophically, vocational agriculture must be viewed as an important part of education, and not simply as a conduit for the transfer of agricultural technology and management knowledge.

### *Reference*

*United States Government Manual, 1980-1981.* Washington, D.C.: Office of the Federal Register, National Archives and Records Service, General Services Administration, 1980.