BRIDGE SCIENCES

Max S. Marshall
405 Davis St., Apt. 1604 – San Francisco, Calif. 94111

The place of basic sciences in schools of agriculture is unquestioned. As a former chairman of one of these sciences, the writer has long felt that "basic sciences" might better be called "bridge sciences" in order to emphasize a primary obligation, to meet students at their individual levels and to carry them to or near the applications. Departments of these sciences, within professional schools, are not training specialists in the sciences; they are fortifying professional people in one angle of the professions. The term "bridge science" describes this function; "basic sciences" suggests and all too often describes too strong an academic outlook. In microbiology, for example, the stress, academic or applied, is likely to depend heavily on the teacher's outlook. Though a member of a professional school, the microbiologist may pay too much obeisance to cellular theory, taxonomy, and microbial genetics. On the other hand, his counterpart on the general campus is likely to capitalize on the popular appeal of the applied.

Biochemistry, for example, can turn its face toward pure chemistry or toward aspects of nutrition. Microbiology can lean toward pure science, it can provide stepping stones to plant pathology or soil science, or it can outstretch itself and poach on practical grounds best left to experts. However presented, students have to find a way to effect the transition from basic science to agriculture itself. The bridge, basic to applied, can be clear or fogbound. The teaching emphasis reflects the personal interests and biases of the staff. Supposedly, the departments on the general campus remain basic and professional departments concentrate on the applied. But on academic campuses certain professors will choose dramatic applications, and, in professional schools, a stress on theory at the expense of pertinent applications reflects the interests of the specialist.

To try to direct a professor in what and how to teach is futile. The field of study is his and he himself is unlikely to change in any major degree. To leave basic microbiology, for example, to the general campus, applying it in the professional school, sounds elegantly simple, but it does not work. General campuses have diversified views of general microbiology, and professional schools have too many professors either dedicated to pure microbiology or enjoying the chance to steal a march on applied courses given by experts by skimming off dramatic highlights. These are realities on which administrative decisions have to be based.

Though outsiders cannot successfully direct professors, they can suggest policies. To urge that basic sciences of the general campus be prerequisites for bridge sciences is only partially realistic. The professional school would then face students who had had good courses (and who would be bored), mediocre courses (and who would be lost), excesses of applied instruction (and who would have to be untangled), or courses too many years earlier (and who would need orienting).

The alternative is to begin these sciences in the professional schools, with broadly defined obligations. These schools need educated applicants, but not trained ones. The bridge leads from varied educational backgrounds to a specific goal. General campuses prepare impartially for unspecified futures, including one of countless kinds of specific training. They have no obligation to do spade work for any one school. To teach techniques which will ease the work of teachers in a professional school is to confuse and to waste educational time. The function of the general campus is as distinct as that of the professional group. If earlier courses in bridge sciences have been neither required nor recommended, the professional school has students who will take its courses at appropriate times and levels. Students then take these courses as members of a professional group and not as young persons with vaguely defined futures. The general campus is for solid but nonprofessional backgrounds.

The suggested policy fortifies a professional approach in bridge sciences but it does not speak for glorified departments. To convert units in "basic sciences" into departments of bridge sciences would be more than a whim. The obligation of these departments is to the specific profession. They cannot be monumental departments dominated by graduate students to be trained in the departmental image. Academic study is for the staff members' delectation as scholars so that they may teach well when applied phases are proven. The course provides enough fundamentals to support what is to come and then shifts into pertinent applications. To dwell on fundamentals which the professor enjoys or to use his teaching time by stealing drama from the truly professional courses is out of line. Pertinent topics are always plentiful.

Devotion to one's subject can be a drawback in training for specific professions. Such honest but selfish devotion is one-sided, an outlook notably and dubiously augmented by graduate students. The urge to turn out specialists upsets the training function. The Ph.D. is an educational degree, not a professional degree. Graduate students belong to the academic campus, with occasional limited liaison with professional schools when essential to their training. To designate the so-called "basic sciences" functionally and by name as bridge sciences would help to correct many erroneous viewpoints. To prepare a student for one of the many phases of agriculture is a whole training program into which a bridge science is obligated to fit.

Departmental study and research do not demand dedication to graduate students, so often responsible for inattention to professional students. Now endangered by alleged curricular streamlining, the bridge sciences need support in the use of teaching laboratories and time to teach. The suggested policy does tend to cut departments sharply, however, in an over-all sense, to overcome a situation in which expanded staffs invent too many inappropriate activites. Departments will not like this phase, but is it bad? I think not, when balance is at stake. A policy is in order, and policies are supposed to be based on balance and reason, not on politics, greed, or expediency.

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STUDENT ATTITUDES TOWARD FARM EMPLOYMENT AS AN OCCUPATIONAL ALTERNATIVE

LeRoy Rogers[1], Myron Wirth[1], and Terry Francl[2]

Colleges of Agriculture and high schools have long recognized that a declining percentage of their students will farm. This has been just one reason for developing programs to prepare an increasing percentage of students for employment in government, farm-related businesses, or other nonfarm jobs.

Even if farm youth have less opportunity to farm for themselves, the number of nonmigrant year-round farm employees has stabilized. Such employment has actually increased in recent years. The Census of Agriculture reported 691,068 regular farm workers in 1954, and a very modest increase to 700,256 in 1959.

The figure jumped to 889,581 in 1964.

Farm operators regularly say it is hard to hire and keep qualified year-round employees. Today's larger, more complex farms require employees with more knowledge and more sophisticated managerial and technological skills.

Many farm youth continue their education in colleges of agriculture and acquire these necessary technological skills. But few choose to use their education as farm employees. Many of these young people say they prefer farm-type work and rural living. Yet they have little interest in seeking farm employment as a vocation. Seemingly, there exists a paradox. We have coexisting an expressed need for qualified employees on the one hand. We also have many farm youth who have the desired technical attributes and also prefer farming and rural life.

Reconciliation of this seeming paradox likely requires more understanding of the position of both farm employers and agricultural students. A survey of 213 college of Agriculture students at Washington State University and three community colleges and 107 Vo-Ag students in 8 high schools was made. The data show how they see full-time farm employment as an occupational alternative. This information will be of use to employers seeking to hire such young workers for responsible positions on modern farms. Faculty in Colleges of Agriculture and Vo-Ag instructors will find this information useful in program development and for counseling youth.

Information was gathered from students by means of a questionnaire administered during an agriculture class. Schedules were mailed to instructors who had earlier expressed a willingness to cooperate in the study. A detailed explanation of the project and the survey instrument provided a more uniform interpretation among groups.

The completed schedules were collected by the instructors and returned to the Department of Agricultural Economics at Washington State University. Three of the state's four community colleges with significant agriculture programs cooperated in the study. The 8 high schools were selected to provide a geographic representation of the state.

Occupational Choice

The study was designed to gain insights into the attitudes of agriculture students toward farm employment, but information also was obtained on the preferred occupation of students. Forty-three percent of the students said they most preferred to farm for themselves. These individuals were then asked to state an occupational preference if they could not farm for themselves.

When all students were asked their occupational preference, excluding farming for themselves, only 17% chose farm employment. Farm employment was defined as being employed as a full-time or year-round employee on a farm or ranch. It, thus, appears that farm employment is not held in high regard by students studying agriculture in either high school or college.

TABLE 1
Occupational preference of students, excluding farming for themselves

Occupation	High school (%)	College (%)	All students (%)
Agri-business	17	42	34
Government	27	17	20
Farm employment	11	19	17
Teaching	7	11	9
Other	38	11	20

High school vocational agriculture departments and Colleges of Agriculture are both increasing their emphasis on preparing students for careers in business and governmental employment. This is consistent with the expressed preferences of students. Over half of all students surveyed indicated their first choice of employment was in one of these categories. Thirty-eight percent of the high school students' responses were classified as "other," including such diverse choices as deep-sea diver and police officer. Note that in expressing these choices, students may to some extent be reflecting a bias, or course orientation, of the school.

Students were asked the most important reason for their choice of occupation. Earning potential ranked no higher than fifth as the most important reason for choice of an occupation (Table 2). It is hard to know what interpretation students placed on the two categories labeled, "stepping stone to better opportunity" and "greater opportunity." It is likely that to some extent, both categories reflect an earnings motivation.

The "stepping stone to better opportunity" reason was intended to convey the idea that the initial job would serve as a good means to a more desirable occupation. The "greater opportunity" reason was intended to mean substantial opportunities within the first-chosen occupation. If the two were combined as a single "opportunity" classification, it would be the second most important category, only ranking lower than "interesting work."

TABLE 2
Percentage ranking of reasons for preferred occupational choice

Reason	High School (%)	Community College (%)	WSU (%)
Interesting work	27.5	32.3	30.9
Maintain contact with farm	3.6	14.9	15.7
Stepping stone to better opportunity	10.9	12.6	12.5
Opportunity to serve	13.5	10.8	11.0
Stability	8.7	6.6	7.1
Earnings potential	8.1	7.8	6.8
Greater opportunity	8.9	5.0	6.3
Other	18.8	10.0	9.7

The category "interesting work" clearly dominated the reasons for occupational preference, being larger than the sum of the three earnings categories for the post-high school students. Maintaining contact with farming was a major concern for college students, but ranked quite low for high school students. A clear message comes through. A large number of these students are motivated both by a desire for interesting work and by a desire to maintain contact with farming. A reasonably responsible position as a farm employee should meet the first need. The desire to maintain contact with the farm is automatically met through farm employment.

Attitudes Toward Farm Employment

The attitude of students toward farm employment was evaluated through questions requiring them to compare farm employment with their expressed occupational preference. For example, if a student preferred to become a teacher, he was given 31 different situations and asked to compare teaching with farm employment for each situation. The situations were designed to facilitate measurement of need fulfillment in a Maslow-type need hierarchy[2]. The ten need categories, or categories of human wants, specified in this study were:

1. Income; 2. Health; 3. Work environment; 4. Physical association and contact; 5. Acceptance by others; 6. Love and affection; 7. Recognition; 8. Dominance; 9. Independence; 10. Achievement.

Anywhere from one to six situation statements made up a need category. The statements were randomly ordered in the schedule and each was followed by a Likert type scale with five alternatives[1].

The respondent compared his conception of farm employment to his preferred occupational choice. In essence, respondents rated farm employment as much more desirable, slightly more desirable, equivalent to, slightly less desirable, or much less desirable than their stated occupational preference. A five-point scoring system was used to evaluate the responses. A one was assigned to responses most favorable to farm employment and a five to responses least favorable to farm employment. Mean scores were computed for each need category by summing the respondent's scores for all questions in that classification and dividing by the number of individual statement responses. Thus, a score of 3.0 for a need category would show indifference to that need category between farm employment and the stated

occupational preference. A score of less than 3.0 reflects a favorable response toward farm employment as compared to the stated occupational choice.

Attitudes by Category of School

Washington State University students, largely juniors and seniors, consistently viewed farm employment as relatively less desirable than either community college or high school students. The difference between WSU and community college students was generally smaller than between community college and high school students.

Farm employment was viewed more favorably than the stated occupational choice for only two categories of need: love and affection, and independence. The love and affection category was concerned primarily with the desirability of rural living and employment for raising a family and the social environment for both a family and a single male. The need for independence related to one's opportunity to act as his own boss in an employment situation.

Farm employment was least desirable in terms of satisfying the income need. The length of work day and week combined to create an undesirable work environment for farm employment. Farm employment was also found lacking in its ability to meet the need for acceptance by others and for recognition. It appears that there is some social stigma attached to farm employment.

Several hypotheses may be advanced as to why attitudes toward farm employment appear more unfavorable with increases in amount of education. There may be a natural selection process introducing a bias against farm employment. Students with professional employment aspirations may well have a bias against farm employment. These students find it necessary to get a college degree, therefore weighting the mix of university students more heavily toward professional interests. In addition, upper division university students have had a longer exposure to higher education, an environment in which traditional rural values are not as highly esteemed as in rural communities.

TABLE 3
Mean scores of attitudes toward farm employment by school level[1]

Need Category	High School	Commun. College	WSU	All Students
Favorable to farm employment:				
Independence[2,3]	2.3	2.8	2.9	2.7
Love & affection	2.8	2.9	3.0	2.9
Unfavorable to farm employment:				
Income[2,4]	3.4	3.7	4.1	3.7
Work environment	3.5	3.5	3.7	3.6
Recognition[2]	3.3	3.4	3.6	3.4
Acceptance by others[2,4]	3.3	3.3	3.6	3.4
Achievement	3.1	3.1	3.4	3.2
Dominance[2]	2.8	3.1	3.2	3.0
Health	3.0	3.0	3.1	3.0
Physical association & contact	2.9	3.0	3.0	3.0

1. Low scores are more favorable to farm employment. A score of 3.0 indicates indifference between farm employment and occupational choice.
2. Difference between high school and WSU significant at 10% level.
3. Difference between high school and community college significant at 10% level.
4. Difference between community college and WSU significant at 10% level.

Attitudes by Residential Background

Students with a farm background viewed farm employment more favorably than those with rural nonfarm backgrounds, who in turn viewed farm employment more favorably than those with an urban background. These differences were more evident for the income, health, dominance, and independence categories. However, mean score differences among categories of residential background were not significantly different at the 10% level.

Attitudes by Occupational Choice

Students were classified according to their occupational choice, excluding "farming for themselves," to determine if attitudes towards farm employment differed among people who aspired to different types of vocations. The responses were divided into one of four specific employment categories or into an "other" category. Those students who preferred a specific type of farm employment (e.g., herdsman, orchard manager, etc.) were asked to compare the general category of farm employment to their choice of specialized type of farm employment.

The undesirable rating (3.3) given to the independence category by those choosing a specific farm employment requires some explanation, because the independence category received the most favorable ranking in results presented earlier. A value greater than 3.0 should have been expected of the farm employment class because their choice of a specific farm employment situation usually was a supervisory position. It is unlikely that they would have considered the general category of farm employment to offer more opportunities for independence than an explicit supervisory position.

Students preferring any of the four kinds of employment other than farm employment held rather similar attitudes towards the various need categories. The only other difference significant at the 10% level was between the agri-business and "other" employment category with respect to income. Thus, there is little evidence that students expressing preferences for various types of nonfarming employment differ with regard to the specific deficiencies of farm employment. All four categories found farm employment most lacking in income and a good work environment. They also rated farm employment universally superior to their occupational preference in both independence and love and affection.

TABLE 4
Mean scores of attitudes toward farm employment by occupational choice

	Occupational Choice				
Need Category	Specific Farm Employment	Agri-Business	Government	Teaching	Other
Independence[1]	3.3	2.6	2.5	2.7	2.4
Love & affection	2.8	3.0	2.9	3.0	2.9
Income[2,3]	3.3	3.9	3.9	4.0	3.5
Work environment[2]	3.2	3.7	3.7	3.9	2.5
Recognition	3.4	3.5	3.5	3.5	3.2
Acceptance by others	3.2	3.5	3.4	3.6	3.3
Achievement	3.3	3.2	3.4	3.3	3.1
Dominance[4]	3.5	3.1	2.9	3.2	2.7
Health	3.0	3.1	3.1	3.0	2.9
Physical association & contact	3.0	3.0	2.9	3.1	3.0
Average of all categories	3.2	3.3	3.2	3.3	3.0

1. Difference between Specific Farm Employment and the three categories of Agri-Business, Government, and Other significant at 10% level.
2. Difference between Specific Farm Employment and the three categories of Agri-Business, Government, and Teaching significant at 10% level.
3. Difference between Agri-Business and Other significant at 10% level.
4. Difference between Specific Farm Employment and the two categories of Government and Other significant at 10% level.

Salary Expectations

Students expected a starting annual salary that would average $7,629 in their perferred occupation. Washington State University students expected to receive approximately $1,000 per year higher starting salary than either community college or high school students. Note that many of the high school and community college students planned schooling beyond their current level before entering the employment market. The $8,270 average for expected starting salaries by Washington State University students was realistic. It was only $277 less than that reported for 1972 bachelor of science graduates from the College of Agriculture[3]. A similar pattern existed for expected salaries 10 years

after entry into their chosen occupational field. The expected salaries 10 years hence reflected an average annual increase of approximately 5.5%.

On the average, high school students would require a slight salary premium over anticipated salaries to accept farm employment. On the other hand, community college and university students would have been willing to accept about $50 per month lower starting salary under farm employment than they expected to receive in their stated occupational preference. This is consistent with the relatively low ranking given to earnings as a reason for choice of occupation. Thus, it can be inferred that agriculturally-trained students may be induced into farm employment at starting salaries slightly lower than offered by competing employers.

TABLE 5
Anticipated salaries and required salary to induce employment on a farm

Income Measure	High School	Community College	WSU
Anticipated starting salary[1]	$ 7,189	$ 7,170	$ 8,270
Expected salary 10 years hence[2]	12,215	12,483	13,839
Lowest starting salary required to induce farm employment[3]	7,505	6,571	7,763
Anticipated starting salary less lowest starting salary required to induce farm employment[4]	228	-644	-600

1. WSU significantly higher than either community college or high school at 10% level.
2. WSU significantly higher than high school at 10% level.
3. Community college significantly lower than either high school or WSU at 10% level.
4. All students did not respond to both the anticipated starting salary and lowest starting salary required to induce farm employment questions. Therefore, these figures represent the difference between means only for those students who responded to both questions.

Major Advantages and Disadvantages of Farm Employment

Students were asked an open-ended question on the major advantages and disadvantages of farm employment. Responses were so wide-ranging that a classification scheme that included a meaningful percentage of respondents was difficult to develop. One-third to nearly one-half of the responses had to be lumped into an "other" classification.

Job stability dominated the advantages specified for farm employment. This is unexpected, since farm employment usually lacks institutional arrangements that provide job security, such as exist under civil service or certain collective bargaining situations. Interesting work, which dominated the reasons for selection of occupation, was listed as a major advantage by 8% or fewer students in each school category.

The limited opportunity for employees to be responsible for decisions was considered to be the major disadvantage to farm employment. High school students considered the long hours to be almost equally as great a disadvantage as the lack of decision-making responsibility. Community college students were about equally divided between low income and long hours as the second most important disadvantage. Similarly, Washington State University students were about equally divided between low income and limited advancement potential as the major disadvantages to farm employment after the lack of opportunity to exercise decision-making responsibility.

Summary and Conclusions

Students' attitudes toward farm employment are negative. Farm employment ranks a poor second to the students' first occupational choice in 5 of 10 need categories. Students ranked farm employment as distinctly inferior in income, work environment, acceptance by others, recognition, and achievement. Students view farm employment as positively fulfilling the need categories of independence and love and affection. They are relatively indifferent toward farm employment with respect to the categories of health, physical association and contact, and dominance.

The most negative attitudes toward farm employment concerned income and work environment. When farm employment was compared with other occupational alternatives with respect to salaries, length of work day, and number of work days per year, the problem became quite apparent. Farm employees work more days, longer hours, and receive less pay than is typical for nonfarm employment situations.

The major consideration in choice of occupation was that it be interesting work. This was followed by a work situation that provides an opportunity to maintain contact with farming, to move to a better position, and to serve people. The fifth most important consideration was stability of employment, the only advantage that students associated with farm employment.

A clear message should be coming through for farm employers seeking to hire agriculturally-trained students. Starting salaries cannot fall much more than $50 per month below that offered by competing industries. Farm employers will likely find it a useful recruiting and employee retention strategy to move qualified workers quickly into positions of decision-making responsibility. This will make the job more interesting and also raise the image of farm employees as a group. In addition, there is a need to reduce the annual work requirement, recognizing the necessity for long hours during selected seasons of the year.

Worker recruitment should capitalize on the two characteristics of farm employment toward which students attitudes were favorable. Students expressed the attitude that farm employment provides for more independence on the job. Also, students viewed the rural farm setting as a desirable environment in which to reside and raise a family.

There is also a message in these findings for high school agriculture departments. Instruction should emphasize development of skills for decision-making. Students should develop these and other skills enough to project an image of responsibility in decision-making. There is a need to develop among students an awareness of the evolving structure of agriculture, which requires well-qualified farm employees. This in turn will help raise the image of farm employment so that it receives higher social acceptance.

Programs for agricultural students should provide instruction in personnel management to increase efficiency of existing employees and to aid in recruitment of qualified workers. Adult education programs in high schools, community colleges, and through the Cooperative Extension Service may find this useful in working with employers to improve farm employment situations for year-round workers.

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[1]Professors of Agricultural Economics, Washington State University.
[2]Former graduate student, Washington State University, currently with the Federal Reserve Bank in Chicago, Illinois.