Review of Agricultural Economics—Volume 22, Number 1—Pages 23–33

Gender Based Differences of Performance and Pay Among Agricultural Economics Faculty

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In 1998, the Committee on Women in Agricultural Economics (CWAE) began a tracking project to more closely examine and report on issues and trends in the agricultural economics profession. This study presents results on performance and pay among academics, focusing on differences across genders. Experience and refereed journal articles appear to have the greatest affect on salary differences. Discussion on several academic issues of debate, including nine- versus eleven-month appointments and workload expectations, is also presented.

Merit evaluations and pay raises may be the most critical decision points for academic administrators and faculty who hope to equitably treat colleagues and maintain high morale. It is not clear that all agree on what constitutes superior academic performance. Aside from differential expectations, there may be significant differences in salary based on the appointment mix of professionals (research, teaching, extension, and administration).

This study presents salary and performance findings from the 1998 Committee on Women in Agricultural Economics (CWAE)/American Agricultural Economics Association (AAEA) Tracking Survey, focusing on academic agricultural economists by rank, experience and gender. Since 1998 was the first sampling in the tracking survey, there is no analysis of trends, progress, or retention. Rather this study presents a snapshot of the current status of the profession. As a benchmark, generalized position, performance, and salary data are presented for the entire sample of agricultural economists.[1]

The American Agricultural Economics Association Employment Services Committee of the (AAEA-ESC) conducts regular surveys of all academic departments to determine important trends (Etheridge; Marchant and Zepeda; Zepeda and

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Marchant). Data from past surveys include various demographic, regional, and salary averages, as well as tracking hiring, promotion, and attrition of agricultural economists. Although the AAEA-ESC surveys provide a wealth of information, there is no tracking of individual or personal factors across time. The CWAE tracking project intends to contribute in this area, and this study presents some of the findings from the first survey.

Trends in Academia

Marchant and Zepeda showed a decreased demand for new Ph.D.'s in agricultural economics between 1990 and 1993, creating a new market for postdoctoral positions. Agricultural economics department head responses on graduate student placement indicated that academia employed only one-third of new Ph.D. recipients in 1993, a significant decline from the 41% reported in 1986. Yet, there was an expected turnover of 33% among faculty during the 1990s, so the importance of academia as an employer was expected to increase through the decade. Zepeda and Marchant's 1998 study focused on the fourth AAEA-ESC survey, based on reports from fifty-three universities covering 1993 to 1996. They found that faculty numbers had in fact increased, but that many of the new positions were non-tenure track. Tenure track assistant professor numbers continued to decline due to fewer hires, promotions, and attrition. They also reported that faculty continued to grow older, on average, and that women and minorities made little progress in gaining representation among the departments surveyed.

Unlike K–12 education where the issue of pay for performance is currently a hot topic, higher education has historically used merit evaluations to determine pay and promotion for professors, lecturers, and research associates. Although merit pay is not a new issue for higher education, the matter of how experience, accomplishments, and responsibilities affect salaries is still debated. These factors are especially important in the debate of why pay varies across gender and race.

There are several primary factors that may differentiate pay among agricultural economists in academic positions including type of appointment, mix of activities, type of academic institution, and individual productivity differences. The type of appointment varies not only by the number of months with dedicated (or hard) funding, but also by whether the position is tenure track, tenured, or based on year-to-year contracts (soft money). The distribution of "effort" also varies greatly among faculty, with appointment mixes that may include administration, extension, research, and teaching. Moreover, there is little consistency across institutions regarding what percentage shares of teaching, research, or extension actually mean in terms of workload. These examples are only some of the differences expected among academic institutions, since the state, region, or focus of the educational institution may dictate the workload and focus of an agricultural economist's effort and output.

Recent reports on the status of the faculty conclude that faculty productivity is difficult to observe and measure (CFAT). Yet, a recent study found evidence that most faculty salaries in departments governed by Utah's experiment station were competitively determined (Barrett and Bailey). This conclusion was based on the empirical finding that differences in salary across seniority and gender could be explained by differences in productivity. More specifically, this study

found that the number of scholarly publications was the primary determinant of salaries, controlling for other factors (such as field of study, experience, gender, grant dollars awarded, and the number of job offers from other institutions).

The Role of Gender

The gender gap in salaries of agricultural college graduates has been reported in Broder and Deprey; Preston, Broder and Almero; Barkley; and Barkley, Stock, and Sylvius. Each study found that females were paid significantly less than their male counterparts after controlling for several personal and professional characteristics other than gender. Although these studies did not focus on post-graduate students or agricultural economists specifically, they did represent a subgroup of the sample.

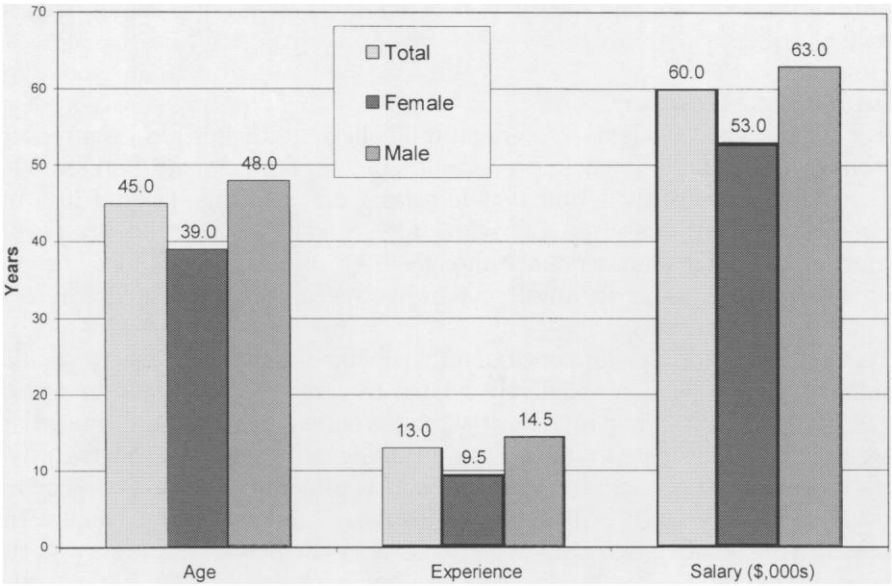
Barkley, Stock, and Sylvius concluded that a woman's choice to marry and have children significantly was negatively related to earnings (absolutely by $13,700, or $7,700 after controlling for other factors) whereas these same characteristics were positively correlated with a man's earnings. They also found there were differences in both gender characteristics and treatment of the sexes. Major field of study and experience explained half the salary difference given that a high proportion of female academics were in lower paid fields. The higher starting salaries for males and effects of marital and family choice, both with implications for gender bias, accounted for the other half of current salary differences. This, together with the finding that women in agricultural economics are less likely to be married, have children, or have as many children (Cheney), may indicate a perceived need of agricultural economists to choose between career and family. Although beyond the scope of this study, it is a theory that warrants further study.

Data and Methods

As mentioned earlier, data for this study were taken from the 1998 Committee on Women in Agricultural Economics (CWAE)/American Agricultural Economics Association (AAEA) Tracking Survey, detailed in the Cheney article in this feature. This paper will focus on the subset of questions related to employment responsibilities, productivity, salary, and years of experience. Salary in any field of work is likely to be strongly correlated with age and experience. Figure 1 shows the average age, experience, and salary for all survey respondents (non-academic in addition to academic), as well as the female and male sub-samples. Although females are paid less, it may be explained by fewer years of experience. It is interesting to note that females are an average of nine years younger, but have only five years less experience, indicating that they enter the professional job market at an earlier age than males. Yet, much of this difference may be due to past roles and responsibilities of males and females (head of household, military service, and the relative scarcity of females in the profession twenty years ago). Among the most recent Ph.D.'s (assistant professors with one to six years of experience), males average only one year more of work experience than females.

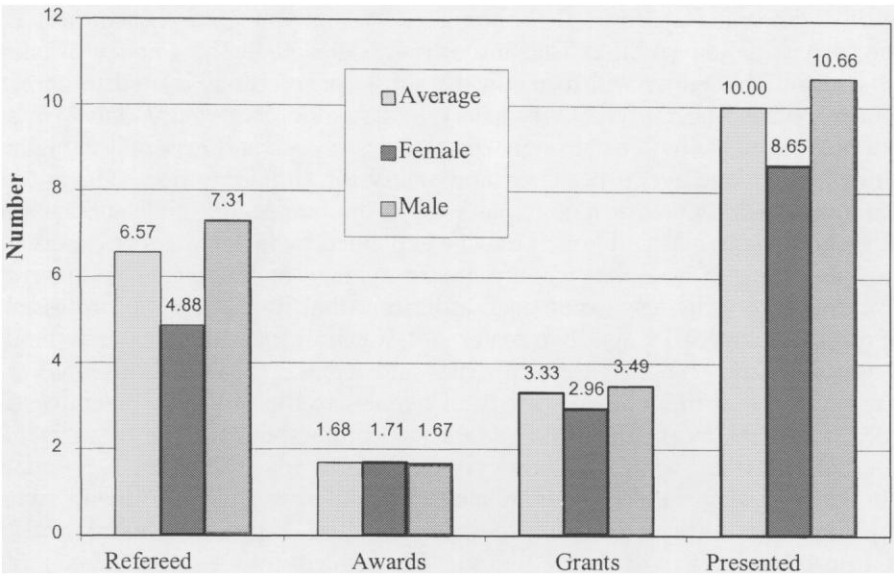
In theory, salary should also be related to cumulative accomplishments (which may likely be correlated with experience). Figure 2 presents initial statistics on research productivity from the survey, divided into gender sub-samples.

Figure 1. Professional experience and salary, 1998 averages



The greatest variance across gender is refereed journal articles and paper presentations at professional meetings. The lower average in these categories for females may be due to less experience or a function of other factors. However, these findings likely influence salaries, regardless of cause. Teaching performance, with the

Figure 2. Professional accomplishments, total output, 1993–98



exception of credit hours taught, is more difficult to measure, so teaching is less of a focus in this analysis.

To determine how specific factors may affect differences in salary and productivity across gender, our analysis focused on smaller, more similar cohorts of professional. Cohorts were chosen in order to examine how specific factors may affect differences in salary productivity across gender. First, we divided respondents based on rank, years of experience, and gender. Then, the average for each grouping's position responsibilities (table 1) and performance measures (table 2) are presented. The number of observations (N) indicates the number of individuals in each rank–experience–gender grouping, with 280 academic respondents in the sample used for this study.

The largest cohort is male, full professors with over ten years in rank, followed by male associate professors with one to five years and six plus years in rank, respectively. Although the number of females is relatively low, the share of females at lower ranks and with fewer years of experience illustrates an increasing presence of women in academia. The balance in gender shares at lower ranks allows for more effective comparisons among those cohorts.

Academic Responsibilities and Performance

Academic positions are presented in table 1 to reflect the share of dedicated funding from four primary areas (teaching, extension, research, and administration), contract length (share with eleven- rather than nine-month contracts), credit hours taught per year, and salary. The salary is given in absolute and eleven-month equivalent terms to control for the pay differences that would be expected between nine- and eleven-month contracts.

The performance measures presented in table 2 were self-reported by respondents based on accomplishments during 1993–1998.[2] Accomplishments reported are self-explanatory with the exception of other publications.[3]

Comparative Analysis of Academics

The statistics reported in table 1 are interesting for comparative purposes, and as benchmarks of average performance and salary levels. For comparative purposes, table 3 presents the coefficients of correlation between type of position appointment and several performance, pay, and contract factors. (Significance is denoted by x and was tested following Johnson.) In general, the number of eleven-month contracts for academics is decreasing over time (as measured by rank and years of experience in cohorts), with the exception of those with extension appointments. Extension responsibilities were positively and significantly correlated with eleven-month contracts ($\rho = 0.316$). This is not surprising given recent attempts by many universities to use nine-month contracts as a method to encourage faculty to pursue external funds. The likely effect of nine-month contracts on professional output is discussed later in this paper.

As expected, the share of administration increases with rank and years of experience, but there is notable variability within cohorts (as measured by variance across individuals and the difference in means). Across the entire sample, teaching and research comprise 33.9% and 35.3% of the average academic position,

Table 1. Academic position, responsibilities, and salary, 1997

Rank and Gender	N	Share with 11-Month Contract	Credit Hours/ Year	Share of Current Position In:				Annual Salary	
				Admin.	Teaching		Extension	Unadjusted Research	Adj. to 11 Mos.
All	280	62%	8.50	13.4%	33.9%	15.2%	35.3%	$61,700	$66,910
Full, 10 + yrs., female	5	60%	7.40	12.0%	28.0%	4.0%	56.0%	$77,500	$84,389
Full, 10 + yrs., male	76	71%	6.80	28.9%	25.3%	14.8%	29.1%	$80,933	$86,149
Full, 5–10 yrs., female	1	100%	9.00	0.0%	30.0%	0.0%	70.0%	$70,000	$70,000
Full, 5–10 yrs., male	20	80%	7.90	14.5%	29.6%	21.7%	34.0%	$66,000	$68,933
Full, 1–5 yrs., female	11	55%	6.09	7.7%	28.2%	27.3%	35.5%	$60,900	$66,990
Full, 1–5 yrs., male	20	50%	9.90	14.0%	43.3%	5.3%	37.3%	$63,500	$70,556
Associate, 6 + yrs., female	14	50%	7.80	26.8%	32.0%	13.6%	26.1%	$63,750	$70,833
Associate, 6 + yrs., male	24	67%	13.00	1.9%	38.6%	19.1%	40.4%	$49,570	$53,205
Associate, 1–5 yrs., female	17	59%	10.71	4.1%	35.2%	20.3%	27.4%	$51,760	$56,476
Associate, 1–5 yrs., male	27	59%	8.67	6.8%	37.4%	13.8%	42.3%	$58,150	$63,448
Assistant, 4–6 yrs., female	17	47%	10.18	2.4%	49.9%	1.5%	45.1%	$46,470	$51,943
Assistant, 4–6 yrs., male	13	54%	7.23	0.0%	38.0%	17.9%	36.3%	$45,380	$50,019
Assistant, 1–4 yrs., female	17	41%	11.82	1.5%	45.8%	11.8%	38.1%	$43,530	$49,237
Assistant, 1–4 yrs., male	18	67%	6.17	5.8%	29.4%	24.4%	38.3%	$43,333	$46,511

Table 2. Academic performance measures by rank, years of experience, and gender: Productivity measures for the five-year period, 1993–98

Rank and Gender	Refereed Journal Arts.	Presented Papers	Books	Chapters in Books	Awards	Grant $ per Year	Other Pubs.	Salary (Unadjusted)
All	7.00	10.27	0.24	1.80	1.06	$26,000	19.56	$61,700
Full, 10+ yrs., female	14.40	25.60	0.40	7.80	3.00	$47,500	26.8	$77,500
Full, 10+ yrs., male	6.75	8.91	0.38	2.18	1.29	$28,750	21.67	$80,933
Full, 5–10 yrs., female	1.00	7.00	1.00	7.00	0.00	$20,000	6.00	$70,000
Full, 5–10 yrs., male	5.80	9.65	0.45	2.90	0.60	$27,000	34.25	$66,000
Full, 1–5 yrs., female	7.36	9.64	0.18	1.91	1.82	$37,000	17.64	$60,900
Full, 1–5 yrs., male	11.90	22.05	0.30	2.15	1.50	$36,840	31.55	$63,500
Associate, 6+ yrs., female	4.29	4.36	0.14	1.07	0.57	$22,100	10.57	$63,750
Associate, 6+ yrs., male	8.29	13.25	0.04	1.21	1.38	$24,500	25.21	$49,570
Associate, 1–5 yrs., female	6.18	8.59	0.12	1.82	0.65	$18,000	10.00	$51,760
Associate, 1–5 yrs., male	8.48	10.74	0.26	1.59	1.00	$35,185	22.81	$58,150
Assistant, 4–6 yrs., female	5.18	7.00	0.12	1.06	0.94	$12,350	8.41	$46,470
Assistant, 4–6 yrs., male	9.38	11.54	0.15	0.77	1.08	$20,770	14.00	$45,380
Assistant, 1–4 yrs., female	2.29	7.76	0.06	0.82	0.41	$12,500	7.71	$43,530
Assistant, 1–4 yrs., male	5.50	6.00	0.06	0.61	0.44	$17,050	10.22	$43,333

Table 3. Correlation between type of position and performance/ salary measures

	Administration	Teaching	Extension	Research
Salary	0.355*	−0.322*	−0.105	−0.053
Refereed publicatons	−0.106	−0.089	-0.141	0.025
Grants	−0.017	−0.241*	−0.128	0.093
Credit hours	−0.173	0.223*	−0.459*	−0.160
Awards	0.231*	−0.066	0.052	−0.075
Other publications	−0.190	−0.198*	0.063	−0.025
11-month contract	0.363*	−0.436*	0.316	0.243*

respectively. Few individuals have no responsibility in these areas. The share of teaching and research also appear to be consistent across rank, experience, and gender, and show the least variability across individuals and cohorts.

It is interesting to note that, while the share of teaching in a position is significantly correlated with credit hours taught ($\rho = 0.223$), it is significantly less than one. This may illustrate the variance of workload expectations per full time equivalent (FTE) among academic institutions. The average teaching load across agricultural economists is 8.5 credit hours per academic year. Given the average teaching share, a full-time teaching load would be approximately twenty-five credit hours. It is also interesting to note that females tend to have a higher share of teaching positions (likely associated with the fact that women are less likely to hold extension appointments).

It does appear that those at lower ranks are protected from high teaching loads by their departments, with slightly lower credit hours reported by the assistant cohorts. Yet, such strategies are not supported by the finding that teaching load (credit hours) has an insignificant, albeit negative, effect ($\rho = -0.028$) on publication output.

Pay and Performance

The salary results are presented in absolute and adjusted terms (controlling for the share of eleven-month contracts within groupings). The average annual salary was $61,700 for the sample, or $66,910 if all respondents were paid on an eleven-month basis. Salary increased with rank and experience, but not as uniformly as one might assume. Explaining the differences in these salaries is the focus of the remainder of this paper.

The data for social sciences (rural sociology, agricultural economics, human development, and family studies) published as a Salary Discipline Survey by ten Land Grant institutions (CSU, OBIA) are consistent with those presented in table 1 ($75,126 for full professors, $52,990 for associate professors, and $44,313 for assistant professors, for nine-month contracts). For another comparison, the twelve-month equivalent salaries reported in a previous AAEA-ESC study were $74,329 for professors, $56,604 for associate professors, and $48,828 for assistant professors (Marchant and Zepeda).

Table 3 shows that the correlation between salary and position responsibilities is significant, with higher pay for administrative duties ($\rho = 0.355$) and lower pay for teaching ($\rho = -0.322$). Salary is negatively, but insignificantly, correlated with extension and research ($\rho = -0.105$ and $\rho = -0.053$, respectively). It is also true that higher teaching loads are not conducive to productivity in scholarly writing or grantsmanship (see table 2). This may also explain why those with a high teaching load have lower salaries.

The shrinking share of eleven-month appointments in agricultural economics was noted previously, but the impacts of this trend are not clear. In addition to effects on annual salary levels, one could argue that the move to nine-month contracts should increase grantsmanship as faculty seek to fill out their yearly salary. In this sample, this theory is not supported since there is an insignificant, albeit positive correlation between nine-month contracts and the level of grant dollars ($\rho = 0.026$). In comparative terms, those with nine-month contracts secured $24,400 in grants per year (on average between 1993 and 1998), whereas those with eleven-month contracts were awarded $25,000 per year during the same period. It is also interesting to note that those with eleven-month contracts do not appear to be more productive researchers given their extra resources: they averaged 7.6 refereed journal articles during the 1993–98 period as compared to 7.5 for those with nine-month contracts, regardless of gender, rank, or experience.

The Role of Gender in Salaries

Analysis of the relationship between salary and several employment factors including experience, gender, and productivity was conducted using simple correlation estimates on individual observations (table 4). Salary was most highly correlated with number of years of experience ($\rho = 0.365$ for men and $\rho = 0.344$ for women).

As one may expect, the second most important factor for salary (in absolute terms) was the number of refereed journal publications in the past five years. The relationship between journal articles and the salary of females was higher ($\rho = 0.259$ for women and $\rho = 0.115$ for men). The opposite is true if one looks at all publications and presentations (including chapters, books, extension publications, and manuscripts), where men are rewarded relatively more for being productive in these areas, although neither gender's salary is significantly affected ($\rho = 0.108$ for men and $\rho = 0.045$ for women).

Just as teaching has a negative association with salary, it also appears to lower research productivity (although the relationship is insignificant across the

Table 4. Salary correlations by gender

	Experience/Salary	All Pub./Salary	Ref. Pub./Salary	Teaching/All Pub.
Sample	0.399*	0.097	0.166	−0.062
Women	0.344*	0.045	0.259*	−0.204*
Men	0.365*	0.108	0.115	−0.050

entire sample). It is important to note that teaching load had a more adverse (and significant) effect on publishing for women than for men ($\rho = -0.204$ for women and $\rho = -0.05$ for men). Given the relationship between publications and salary, this may explain part of the difference in pay across genders.

Conclusions

This study examines the role position requirements and productivity play in salary determination, with special attention to academic faculty. The data and comparisons in this paper illustrate several important aspects of the agricultural economics field. First, there is a diverse, interdependent set of job expectations for agricultural economics faculty, all of which affect performance measures and salary uniquely. These effects may also vary depending on the gender of the individual. However, such diversity is not problematic as long as individuals know employers' expectations and rewards. Future research may necessitate regression analysis of longitudinal survey data to control for interdependencies and more accurately analyze the effects of specific factors on individual professionals across time.

Finally, the issue of gender and pay will continue to be debated until the pay of women equals the pay of men in the profession. Although this is not likely to happen until the point in time where women in the field are at the same rank, with the same experience level, this analysis does allow us to examine if cohorts with similar human capital and productivity are treated equally. It does appear that the new cohorts of male and female assistant professors have equal salaries and, with a few exceptions, similar academic positions.

Future surveying and analysis will also allow us to examine whether attrition, employment change, salary trends, or promotion differ by gender. It may also be interesting to analyze how and why position demands and productivity differentially affect women.

Acknowledgments

The author thanks Jennifer Grannis for research support, and Mary Marchant, Handy Williamson, Jr., Janet Perry, and an anonymous reviewer for editorial assistance and valuable comments.

End Notes

[1] Although not the focus of this paper, the CWAE Tracking Survey includes agricultural economists employed outside academia as well as academic types.

[2] The numbers reported are consistent with similar statistics collected by S. Lee Gray at Colorado State University.

[3] Other publications are the sum of several categories including other edited articles and reports, experiment station publications, extension publications, abstracts published, and book reviews.

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