Ranking Agricultural Economics Departments by *AJAE* Page Counts: A Reappraisal

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AJAE per capita page counts provide one measure of an institution's research strength. In this article we refine Willis *et al.*'s measure of department size and, based on the refined measure, recompute departmental rankings for North American institutions. Results indicate that Northeastern United States departments are more widely represented among the top 20 institutions than 20 years ago and that two Canadian institutions—Guelph and British Columbia—rank in the top 12. The median *AJAE* publication frequency for the top 30 research institutions is about one article per research faculty member every 12 years. The *AJAE* page-count measure was found to be highly correlated ($R^2 = 0.82$) with citation counts, whether narrowly or broadly defined. Thus, *AJAE* page counts appear to provide a simple yet valid representation of institutional research productivity.

In a recent issue of this *Journal,* Willis *et al.* presented a ranking of agricultural economics departments based on *American Journal of Agricultural Economics* (*AJAE*) per capita page counts. The per capita counts were computed using a search of departmental size from USDA's *Directory of Professional Workers in State Agricultural Experiment Stations,* the same source used by Simpson and Steele in an earlier institutional-affiliation study. The purpose of this paper is to develop a more uniform measure of departmental size based on *Directory* data and to illustrate its effect on departmental rankings. A secondary objective is to extend the Willis *et al.* analysis to include Canadian institutions. The rankings include a research full-time equivalent (FTE) measure of research faculty size, a measure that more nearly corrects for resource differences among institutions.

An Appraisal of *Directory* Data

Following the tradition established by Finley, Willis *et al.*'s productivity index is based on a per capita measure of the form

$$A_i = P_i/N_i \qquad (1)$$

where i indexes the institution, A_i is the productivity index, P_i is the *AJAE* page count, and N_i is departmental size. Our reappraisal focuses on the denominator of equation (1). Willis *et al.* measure departmental size as the total number of professional workers listed in the *Directory*. Although this measure gives a rough indication of departmental research capacity, it lacks precision for several reasons. First, the reporting of emeriti faculty and non-Ph.D. professional workers (e.g., research-support specialists, computer lab instructors) is non-systematic: some departments include these categories in the *Directory*, others do not. For example, Wisconsin lists 50 professional workers in the *1991–92 Directory,* 18 of which are emeriti. Among North Dakota State's 38 professional workers, 15 are non-Ph.D.s. These departments are penalized relative to departments that choose not to list emeriti or non-Ph.D. support staff.

A second source of imprecision is the inclusion of rural sociology faculty in the size measures for combined departments.[1] Although rural sociologists are not precluded from publishing in the *AJAE,* it rarely happens. The inclusion of rural sociologists, therefore, penalizes combined departments, especially those with relatively large rural

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[1] The *Directory* in most cases lists faculty titles in sufficient detail to determine whether an individual is a rural sociologist. In cases of doubt, we consulted the 1993 directory of the Rural Sociology Society.

Table 1. Research Faculty Counts Based on the *1991–92 Directory of Professional Workers* Compared to Survey Data, Selected Agricultural Economics Departments, United States

	Directory Data						Survey Data[c]	
Department	Total Listed Faculty	Emeriti Faculty	Rural Sociology Faculty	100% Extension/ Teaching Faculty[a]	Non-Ph.D. Staff[b]	Active Ag. Econ. Research Faculty	Research Faculty	Research FTEs
California—Davis	34	0	0	1	0	33	27.8	15.7
North Carolina State	53	13	0	17	0	23	24.0	14.0
Texas A & M	68	0	0	29	1	38	33.0	20.0
Kansas State	43	0	0	21	0	22	16.0	9.0
Illinois	43	0	3	5	3	32	35.6	16.5
Wisconsin	50	18	0	8	1	23	32.0	11.0
Montana State	24	0	0	12	1	11	12.0	5.7
Arkansas	41	0	6	16	5	14	17.0	13.0
Ohio State	70	0	9	30	1	30	27.0	12.5
Auburn	44	5	6	15	3	15	12.5	8.0
North Dakota State	38	0	1	9	15	13	12.6	8.0

[a]To avoid double counting, emeriti and rural sociology faculty listed as 100% teaching and/or extension are excluded.
[b]Individuals with JD and EdD degrees are included in this category. To avoid double counting, the category excludes individuals with 100% teaching and/or extension appointments.
[c]Estimated number of agricultural economics research faculty and research FTEs for the period 1988–92 based on a poll of department chairs/heads conducted May–June 1994.

sociology contingents such as Ohio State, Arkansas, and Penn State.[2]

A final source of imprecision is the inclusion of faculty that do not have research appointments and are not expected to publish in the *AJAE*. Opaluch and Just handled this problem by developing a measure that excluded extension staff, but due to data limitations could not do likewise for teaching staff.[3] Fortunately, the data provided in the *Directory* have sufficient detail to exclude faculty in both categories. The advantage of making this last correction is evident by a perusal of Table 1. Departments with relatively large full-time extension or teaching staff, such as Texas A & M, Montana State, Ohio State, and Kansas State, are no longer penalized relative to other departments, such as California-Davis or Illinois, that have few faculty in this category.

To assess the accuracy of the foregoing procedure for determining research faculty size and to include data for Canadian institutions, we conducted a poll of department chairs to determine (i) the number of faculty employed by the department *over the 1988–92 period* with research appointments and (ii) the number of research full-time equivalents that these faculty represented (e.g., a department with 10 research faculty, each with a 50% research appointment, would have five research FTEs). Bearing in mind that the *Directory* data refer to only one year (1991) and that some judgment is involved in identifying research faculty from the *Directory* listings,[4] The *Directory*-based measure of research faculty size is reasonably close to the department-chair figures (compare columns 6 and 7, Table 1). The simple correlation between the *Directory* data and the survey data for the 40 U.S. departments is 0.90. However, discrepancies in some cases are large enough (e.g., Wisconsin) to suggest that even the corrected *Directory* data should be used with caution. Accordingly, in recomputing the rankings, we used the survey rather than *Directory* data.

[2] That inclusion of rural sociologists biases departmental rankings receives a statistical support from the regression (*t*-ratios in brackets):

$$A_i = 2.99\ [7.02] - 11.00\ [-1.95]\ RS_i/N_i \quad R^2 = 0.10$$

where $i = 1, 2, \ldots, 40$, A_i is Willis *et al.*'s productivity index, RS_i is the number of rural sociologists in the ith institution, and N_i is Willis *et al.*'s measure of departmental size. The regression indicates a significant inverse relationship between the productivity index and rural sociology representation.

[3] Opaluch and Just used a directory for the American Farm Economics Association to obtain data on departmental size. They state "Although it would be desirable to make a separate accounting for those with primarily teaching duties . . . sufficient data are not available in the [directory]" (p. 400).

[4] As pointed out by a reviewer, some departments have faculty other than economists or rural sociologists (e.g., agricultural law) while others list faculty with less than full-time (or even courtesy) appointments in agricultural economics. It is not always possible to identify these individuals from the *Directory* data.

Survey-Based Rankings

The recomputed rankings refer to the 1988–92 refereed (non-invited) article page counts measured by Willis *et al.*, augmented to include Canadian universities. In recomputing the index, we excluded departments that produced less than one *AJAE* article over the 1988–92 period, which resulted in a sample size of 45 institutions (40 United States and 5 Canadian). The top 30 from this group, along with Willis *et al.*'s comparable rankings and total page counts, are listed in Table 2. The discussion refers to research faculty size (not FTE-) based rankings unless otherwise indicated.

Given the large discrepancies between the Willis *et al.* measure of faculty size and our refined measure, the rankings are surprisingly robust. California-Berkeley is top-ranked by all measures. Among the remaining top ten, our rankings are consistent with Willis *et al.*'s except that Kansas State enters the top-ten category and Purdue and Massachusetts drop out. (Guelph, which enters the top-ten in our ranking, was not included in Willis *et al.*'s study.) The appearance of Rutgers in the top six highlights the relevance of Finley's critique that page counts *per se* provide a misleading picture of institutional productivity, (based on total pages, Rutgers would rank 24 rather than six).

The major beneficiaries of the refined measure of departmental size tend to be departments with large reported numbers of rural sociologists, emeriti, and extension personnel. For example, Kansas State and Auburn gain 10 and 12 places, respectively, and Ohio State gains six places. The rather sharp declines in rank for Cornell (12 to 22) and Purdue (9 to 21) may reflect a specialization effect. That is, these two departments exhibit a relatively

Table 2. University Affiliation of *AJAE* Authors and Rankings Based on Page Counts of Refereed Articles, United States and Canada, 1988–92

Department	Pages per Research Faculty	Rank	Pages per Research FTE[a]	Rank	Willis *et al.*'s Pages per Faculty	Rank	Total Pages	Rank
California—Berkeley	13.74	1	21.46	1	9.96	1	199.17	5
California—Davis	10.60	2	18.77	3	8.67	2	294.75	1
Maryland	10.16	3	20.33	2	5.59	3	164.67	6
Iowa State	9.41	4	14.89	5	5.23	5	235.33	2
North Carolina State	9.17	5	15.71	4	4.15	6	220.20	3
Rutgers	7.27	6	7.61	18	5.33	4	48.00	24
Texas A & M	6.55	7	10.81	8	3.18	8	216.28	4
Virginia Tech	5.14	8	8.95	9	3.03	10	94.00	12
Kansas State	5.00	9	8.89	10	1.86	19	80.00	15
Guelph	4.96	10	8.86	11	—[b]	—	69.50	16
British Columbia	4.70	11	8.40	13	—	—	105.67	36
Auburn	4.27	12	6.67	20	1.21	24	53.33	22
Delaware	4.14	13	8.28	14	1.93	16	29.00	31
Wisconsin	3.94	14	11.45	6	2.52	13	126.00	9
Ohio State	3.91	15	8.45	12	1.51	21	105.67	11
Michigan State	3.91	16	7.34	19	1.91	18	86.05	13
Montana State	3.86	17	8.12	15	1.91	17	46.33	25
Arizona	3.80	18	4.85	24	2.28	15	57.00	18
Massachusetts	3.75	19	11.41	7	3.50	7	52.50	23
Illinois	3.66	20	7.88	16	3.03	11	130.25	8
Purdue	3.33	21	7.65	17	3.17	9	133.19	7
Cornell	3.10	22	6.64	21	2.25	12	122.33	10
Georgia[c]	3.03	23	4.51	26	2.40	14	84.17	14
Washington State	2.79	24	4.91	23	1.78	20	55.33	20
Arkansas	2.63	25	3.44	29	1.09	27	44.75	26
Penn State	2.18	26	2.88	34	1.26	22	54.38	21
Nebraska	2.02	27	4.51	27	1.24	23	35.83	29
Oregon State	1.95	28	3.46	28	0.90	29	37.83	28
Kentucky	1.93	29	2.64	36	—	—	29.00	32
Manitoba	1.69	30	2.96	33	—	—	22.62	35

[a]FTEs for British Columbia, Guelph, and Manitoba are estimated at 56% of research faculty size.
[b]Dashed line indicates that the institution was not ranked in Willis *et al.*'s study.
[c]Includes Griffen faculty.

high incidence of three-way (teaching-research-extension) appointments, which may place faculty at a disadvantage relative to departments that permit greater specialization in the separate functions. Three Canadian institutions rank in the top-30: Guelph (10), British Columbia (11), and Manitoba (30).

FTE-based rankings in theory are preferred to research faculty size-based rankings because research FTEs more nearly reflect the actual budgeted resources devoted to research within a particular unit. However, our survey indicated that Canadian departments in general do not use FTEs in their accounting process and that several U.S. institutions have abandoned FTEs as a basis for resource allocation. Bearing in mind these caveats, FTE-based rankings are provided in Table 2. In computing these rankings, we assumed that research faculty at Canadian institutions other than U. of Saskatchewan on average devote 56% of their time to research-related activities, the sample mean for U.S. institutions. (In our survey, the U. of Saskatchewan was the lone Canadian institution that provided a separate number for research FTEs.)

Although the pattern is preserved when research faculty size is adjusted for budgeted time allotted to research, some interesting realignments occur. Rutgers drops decisively from the top ten, being replaced by Wisconsin. Massachusetts ascends to seventh place, edging out Guelph in the top ten. Penn State, Kentucky, and Manitoba drop out of the top-30, being replaced by Colorado (22 place), Minnesota (25), and Maine (30). Auburn, which ranked 12 by the faculty-count measure, drops to 20th place. On balance, the institutions most affected by adjustment for research FTEs are ones with relatively small (e.g., Colorado State and Massachusetts) or relatively large (e.g., Rutgers and Auburn) research appointments (see appendix Table 1).

Despite some relatively large shifts in rankings, Willis *et al.*'s basic conclusion that Northeast departments are more heavily represented in the top 20 than they were two decades ago (when only two Northeast departments were among the top 20) remains unchanged. However, four previously unranked departments (by Willis *et al.*'s measure)—Guelph, British Columbia, Kentucky and Manitoba—enter the top 30 in our refined and expanded measure. The supplanted departments are Florida (ranked 25), Minnesota (ranked 26), Idaho (ranked 28), and Connecticut (ranked 30).

The data in Table 2 indicate that top-ranked Berkeley published 13.74 printed pages per research faculty member for the five-year period

Appendix Table 1. Raw Data Used in the Analysis

Institution	Research Faculty[a]	Research FTE[a]	*AJAE* Pages 1988–92[b]
U. of Arizona	15.00	11.75	57.00
U. of Arkansas	17.00	13.00	44.75
Auburn Univ.	12.50	8.00	53.33
U. of Cal.-Davis	27.80	15.70	294.75
U. of Cal.-Berkeley	14.50	9.19	199.17
Clemson Univ.	23.80	9.64	31.00
Colorado State Univ.	15.00	3.40	19.50
U. of Connecticut	10.00	5.00	10.50
Cornell Univ.	39.50	18.42	122.33
U. of Delaware	7.00	3.50	29.00
U. of Florida	36.00	18.50	57.00
U. of Georgia[c]	27.75	18.66	84.17
U. of Hawaii	18.00	9.65	12.00
U. of Idaho	13.00	10.00	17.17
U. of Illinois	35.60	16.53	130.25
Iowa State Univ.	25.00	15.80	235.33
Kansas State Univ.	16.00	9.00	80.00
U. of Kentucky	15.00	11.00	29.00
U. of Maine	9.00	4.20	13.60
U. of Maryland	16.20	8.10	164.67
U. of Massachusetts	14.00	4.60	52.50
Michigan State Univ.	22.00	11.73	86.05
U. of Minnesota	37.00	13.00	60.33
U. of Missouri	30.00	17.10	41.67
Montana State Univ.	12.00	5.70	46.33
Nebraska	17.75	7.95	35.83
N. Carolina State Univ.	24.00	14.00	220.00
N. Dakota State Univ.	12.60	8.09	18.50
Ohio State	27.00	12.50	105.67
Oklahoma State Univ.	23.00	15.00	26.00
Oregon State Univ.	19.40	10.92	37.83
Penn State Univ.	25.00	18.90	54.38
Purdue Univ.	40.00	17.40	133.19
Rutgers Univ.	6.60	6.30	48.00
U. of Tennessee	21.00	17.00	17.50
Texas A&M	33.00	20.00	216.28
Virginia Polytech Univ.	18.30	10.50	94.00
Washington State Univ.	19.80	11.25	55.33
U. of Wisconsin	32.00	11.00	126.00
U. of Wyoming	9.40	5.00	10.00
Canadian Universities			
U. of Alberta	13.30	7.44	9.17
U. of British Columbia	4.50	2.52	21.16
U. of Guelph	14.00	7.84	69.50
U. of Manitoba	13.40	7.64	22.62
U. of Saskatchewan	16.00	12.00	25.50

[a]Source: Survey of department chairs/heads conducted May–June 1994. Data refer to average for the 1988–92 period. FTEs for Alberta, British Columbia, Guelph, Manitoba, and Missouri are estimated.

[b]Excludes invited papers. Page counts assume that in the case of multi-authored articles, authors from different institutions contributed equally to the published article.

[c]Includes Griffen.

Note: After the analysis was completed, Georgia revised its estimate of research faculty to 23 and FTE to 16.03. This produces 3.66 pages per research faculty (rank 20), and 5.25 pages per FTE (rank 22).

1988–92. Given an average article length of 9 pages, this translates into about one *AJAE* article per research faculty member every three years. By comparison, research faculty at the Table 2's median institution (Ohio State) produce about one *AJAE* article per member every 12 years.[5]

Validity of *AJAE*-Based Rankings

The low frequency of *AJAE* publication suggests that agricultural economists rely on other outlets besides the *AJAE* to communicate their research results. This raises the question of whether an *AJAE*-based ranking is too narrow to be a valid measure of institutional research productivity or scholarly accomplishment. One way to assess validity is to determine whether the *AJAE*-based measure is correlated with other measures of research productivity such as citation counts.[6]

Beilock and collaborators report department rankings based upon citations in the *Social Science Citation Index* (SSCI) and an AGEC citation index (citations in the *AJAE* and five regional agricultural economics journals[7]). They argue that "Citations have the advantage over page or article counts of emphasizing the usefulness of publications, rather than the sheer volume of work. A strong performance in a citations-based ranking reflects departmental strength in publishing innovative and socially relevant research in books and monographs in addition to journals" (Beilock, Polopolus, and Correal, p. 603).

We constructed two per capita citation measures by dividing the SSCI and AGEC raw citation counts for the 1980–84 period reported in Beilock and Polopolus (p. 405) by the faculty size measure reported in Beilock, Polopolus, and Correal (pp. 603–04). The per capita SSCI and per capita AGEC measures were then regressed on the per capita *AJAE* page counts for 1980–83 reported in Simpson and Steele.[8] The statistical fit of the two models was similar: each had an R^2 of 0.82 and the coefficient of the *AJAE* page count variable had a *t*-ratio of 11 in each model. The Spearman-rank correlation coefficient between the Simpson and Steele *AJAE* page-count ranking and the SSCI ranking was 0.75 and between the *AJAE* and AGEC was 0.88. Therefore it appears that the simpler page-count measure and the citation measures are closely related. The relatively high correlations between *AJAE* page counts and citation counts, whether based on disciplinary journals or the more broadly based Social Sciences Citation Index, suggest that per capita *AJAE* page counts are a valid measure of an institution's research productivity.

Concluding Comments

Institutional-affiliation studies are important because they provide signals about research faculty quality. These signals are useful because quality is not static: a comparison of this study's rankings with similar rankings conducted as recently as eight years ago (e.g., Simpson and Steele) indicates significant shifts in research productivity over time, with some previously unranked departments entering the top 20 and others dropping out. Up-to-date information about institutional differences in research quality and productivity can be important to students and academic advisors in school selection; to administrators and department chairpersons in assessing the relative performance of their research faculty; and to funding agencies in assessing an institution's research capacity or capability. In a dynamic setting, perceptions about institutional quality may lag reality (Perry), making up-to-date information on institutional performance all the more valuable.

The fact that *AJAE* page counts are correlated with citation counts, whether narrowly or broadly defined, suggests that the quality signals embedded in *AJAE* page counts are both efficient and valid. That is, the page-count measure used in this study may represent a least-cost method for assessing institutional-based differences in research quality. This view is reinforced by the finding that the rankings are relatively robust to alternative representations of departmental size, which suggests that the per capita page-count measure is reliable.

A limitation of *AJAE*-based rankings is that it focuses on research quality to the exclusion of other factors that may contribute to a department's effectiveness in meeting the Land Grant mission of ". . . applying a sound research base to current issues and problems, and educating citizens about them . . ." (Armbruster, p. 592). Excellence in undergraduate instruction and (to a lesser extent)

[5] The median publication rate, although seemingly low, compares favorably with the average rate for published authors in the economics literature. Authorship data collected by Cox and Chung for articles published in 20 leading economics journals indicate an average publication rate of one article per author every 13 years.

[6] Technically, a performance indicator is considered *valid* if it (i) measures what it is designed to measure (e.g., research faculty productivity) and (ii) is correlated with an external criterion measure (e.g., citations counts). (For example, see Aiken, pp. 95–101.)

[7] The regional journals used are the *Northeastern Journal of Agricultural Economics*, the *Southern Journal of Agricultural Economics*, the *Western Journal of Agricultural Economics*, the *North Central Journal of Agricultural Economics*, and the *Canadian Journal of Agricultural Economics*.

[8] To ensure that correlations are not influenced by differences in the measurement of departmental size, we corrected Simpson and Steele's per capita page counts to reflect Beilock *et al.*'s departmental size measure.

extension may not require a quality research program. International consulting, cross-disciplinary research, and involvement in policy analysis and dialogue may not lend itself to *AJAE* publication. Still, given the high correlation between *AJAE* page counts and the more "socially relevant" citation counts and the importance of peer review to the scientific enterprise (Casti, p. 14), the *AJAE*-based measures provide a useful and objective measure of institutional quality.

Finally, care should be exercised in using *Directory* data as a basis for constructing per capita productivity measures. As demonstrated in this article, the *Directory* data suffer from nonsystematic reporting bias and include faculty members that may not be relevant to the research productivity issue. Although some of the problems with the *Directory* data are correctable, a better strategy is to obtain departmental-size data directly through an independent survey of department chairs or heads, especially given the relatively low cost of the direct approach.

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