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Agricultural and Rural Data Paradigms

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Abstract. Numerous observers have charged U S agricultural data systems with conceptual obsolescence. Although some modernization has occurred, particularly in providing information about commercial farms, agricultural and rural data bases have failed to keep up with production and structural changes in the sector and in rural America. I propose a production paradigm for the food and fiber system based on the concept of a primary agricultural producer. Among other attributes, the concept of a primary agricultural producer provides opportunities to redirect existing surveys, possibly including the Census of Agriculture, to the collection of broader rural or natural resource data sets. Before such a redirection can be made, however, a new paradigm of rural people and resources is needed.

Keywords. Agricultural data, rural data, economic surveys, information systems

Concerns continue to be raised about the adequacy of U S agricultural data systems. Many traditional concepts about farms and rural areas are obsolete, yet demands continue for information to manage and evaluate agricultural production, credit, conservation, and rural development programs. The emergence of a bimodal distribution of farms, in particular, has hampered existing data systems from encompassing the full domain of contemporary agricultural and rural concerns. Agricultural policy primarily focuses on mid- to large-scale farms, but these operations increasingly resemble business establishments in other sectors of the U S economy. If agricultural policy continues to emphasize a market orientation, as seems likely, the need for more information on farm financial and production characteristics than for other businesses seems open to question.

Small farms are not now primary targets of agricultural policy because they do not contribute significantly to aggregate agricultural output nor are they representative of rural people and businesses. Demands for information about local areas, rural people, and rural economies continue apace, but they cannot be adequately met with most production-oriented information sets.

The common response to perceived information gaps has been to call for yet more surveys and broader data coverage. Bonnen, in particular, has consistently

championed the goal of a complete economic paradigm of the food and fiber system. I perceive, however, a growing divergence between the idealized data systems described by Bonnen and others and the complexity of American agriculture and rural society. I question the assumptions that more data about traditional concepts are necessarily desirable, or that a single data paradigm is a reasonable approach to meeting agricultural and rural data needs. Today's budget deficits will surely limit increased funding and political support for expanding Federal agricultural data systems. The pursuit of an all-encompassing data system may obscure gains achieved in improving the precision and focus of current systems.

Consider two paradigms for agricultural and rural data: one for primary food and fiber production and the other for rural people and resources. The production paradigm, I suggest, can be built on the Farm Costs and Returns Survey (FCRS), a joint survey of the National Agricultural Statistics Service (NASS) and the Economic Research Service (ERS). By adopting an FCRS-based data system as the paradigm for the primary stage of food and fiber production, we can redirect resources now devoted to other NASS surveys and the Census of Agriculture to a separate rural data paradigm.

My perspective on agricultural data is that of Federal agricultural policy needs. This perspective does not deny State, local government, and private interests in small-area agricultural data. However, the type of data needed by these entities differs from that required for Federal policymaking, and, I believe, can be furnished more expeditiously as part of a rural data paradigm.

Problems in Current Data Systems

Numerous observers believe the U S farm data system to be inadequate. Contributors to this assessment include a special Committee on Economic Statistics of the American Agricultural Economic Association (AAEA) (3), symposia presenters at AAEA annual meetings in 1972 (12, 17, 27) and 1987 (10, 22, 24), an AAEA presidential address (9), and authors of numerous book and journal articles (see, for example, 4, 7, 8, 11)¹

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¹Italicized numbers in parentheses cite sources listed in the References at the end of this article.

The AAEA Committee on Economic Statistics concluded in 1972 that agricultural data systems were "in deep trouble." The committee saw data demands outrunning the profession's investment in data development and the systems' conceptual foundations crumbling. At a symposium marking the 15th anniversary of the committee report, participants concurred that the promise implicit in the report's title of "New Directions and Opportunities" had gone unrealized (21). Bonnen, a chief architect of the report, concluded that data systems remained about where they were in 1972, with progress in some areas offset by changes in agriculture and the policy environment and by continuing erosion of data system capabilities. Bonnen emphasized

- A declining ability of statistical aggregates to represent an increasingly heterogeneous sector,
- A rising respondent fatigue from repeated surveys of a shrinking universe,
- Declining professional commitment to the empiric,
- Failure to develop a food and fiber sector paradigm consistent with the shift from a demographic to economic Census of Agriculture,
- Failure to recognize structural issues arising out of the progressive concentration of farm production and marketing, and
- Failure to develop a clear statement of the economics of public information

Stanton noted "While [the 1972] report got more attention than most presented at our annual meetings, the groundswell of support that followed from our profession could be likened to an almost unnoticed ripple in a turbulent sea." Stanton identified nine areas for improvement, beginning with "a new definition and classification of farms."

Schertz was critical of the emphasis placed on farm commodity data to the "detriment of information on the 80 to 90 percent of people in rural America who are not farm operators." Schertz cited the continued inattention to the underemployment and waste of rural human resources, the persistence of the "one farm—one farmer—one household" myth, and the limited professional recognition given to data work by agricultural economists.

Not all of the symposium's assessment of current data systems was negative. Both Bonnen and Stanton cited improvements in the national income accounts

and the development of the FCRS, which Bonnen characterized as "a good example of how you have to run fast just to stand still."

Toward a Production Paradigm for Agriculture

The census of agriculture currently defines a farm as any place from which \$1,000 or more of agricultural products were sold or normally would be sold during the census year. Some analysts propose changing the \$1,000 threshold, perhaps indexing it for inflation.² Other analysts use *ad hoc* farm definitions based on value of sales criteria of \$20,000, \$40,000, or more, limiting the relevant universe in some cases to well under 1 million operators.

The 1972 committee report declared "It is simply no longer possible to use the farm as the *basic unit of observation*—we will continue to need to construct statistics that say something about physical farms or firms of various sorts, but the farm or firm as the *basic unit of observation* from which all food and fiber statistics are constructed is conceptually obsolete." The committee did not, however, provide many hints about what a new "basic unit of observation" might resemble, and the literature since the 1972 report continues to equivocate on what should be measured. Bonnen argues for a more comprehensive economic paradigm, integrating input suppliers and secondary processors in a systems approach (7). Carlin and Handy proposed an establishment concept, focusing on detailed economic accounts for the entire food and fiber industry, including input suppliers and output processors (12). Others argue for retaining a farm concept but including more expansive measures of farm and farm-related households, such as multiple household entrepreneurial arrangements (1, 23). Stanton would include other economic actors, particularly farmworkers and landlords, who provide resources to agriculture (24).

A common problem with these suggestions is that they would require more information, from more respondents, than at present. Ahearn and Jensen, Schertz, and Stanton, in particular, would require extensive financial and demographic information from a broadened universe of respondents (1, 23, 24).

²The AAEA Committee observed "The distinction between the definition and the concept of a farm makes efforts to decide whether a farm should begin at \$2,500 or \$5,000 (or any other level) of gross income intellectually futile. Searching for the *right* definition of a concept such as a farm, when the concept itself is obsolete, is intellectually a bootless enterprise" (3).

Bonnen and Carlin and Handy would substantially expand reporting by firms who supply agricultural inputs and process or distribute food and fiber

I propose, instead, to focus agricultural production and financial data collection more narrowly on "primary agricultural producers" I define a primary agricultural producer as any business entity producing, or capable of producing in a normal year, non-trivial quantities of agricultural commodities I use "primary" to designate the first level or stage of production, analogous to the farming establishment component of Carlin and Handy's tableau A nontrivial quantity of output is any production above a specified threshold level for a given commodity or set of commodities Producers would be classified according to commodity specialization based on the current standard industrial classification (SIC) system³

The intent of these definitions is to focus data collection on mid- to large-scale producers, or those making economically significant contributions to agricultural output The production threshold would be set at the increment of production accounting for the *n*th percentage of cumulative commodity output among all producers, ranked from large to small, thus excluding from the universe units producing quantities of output that are insignificant from an aggregate production perspective A target of 99-percent coverage of total value of agricultural output in 1982, as an example, would have allowed a cutoff point of about \$5,000 in sales (1.4 million farms) A 97-percent coverage target (approximately \$10,000 in sales) would have reduced the number of farms enumerated from 2.24 million to 1.14 million A target of 95-percent coverage for some commodities could require enumeration of as few as a quarter or a third of all producers (table 1) Target coverage levels should be determined on benefit-cost principles by recognizing the low marginal utility of production or financial data from the smallest firms, and the potential marginal cost of enumerating many small producers⁴

³For example, "cash grain producers" would identify (a) all individuals or organizations that (b) grow and harvest for sale, temporary storage, or further processing, (c) one or more grain crops classified under SIC category 011, and (d) who, from a ranking of largest to smallest producers, produce or are capable of producing, say, 99 percent of all cash grain crops for a given year

⁴Expected cost savings from excluding the smallest producers may depend on the type of survey The FCRS consists of both a list frame of farm operators and an area frame of rural land In the area frame sample, all residents within a geographic area are typically contacted In this case, the marginal cost of collecting data for otherwise ineligible respondents amounts to only interview time and processing costs For list frame sampling, the problem is knowing the total universe so that a threshold can be determined I assume, however, that a combination of information from area frames, crop surveys, and marketing reports would allow determining the threshold level and identifying producers for the list frame

Table 1—Firms accounting for approximately 95 percent of total sales, selected commodities, 1982

Lower limit of sales class and commodity	Proportion of	
	Sales	Farms
	Percent	
\$100,000		
Poultry and poultry products	94.0	25.5
\$40,000		
Cotton and cottonseed	95.3	60.9
Vegetables	94.8	34.9
Horticultural specialties	94.8	34.7
Dairy	94.8	72.1
\$20,000		
Grains	94.6	62.1
\$5,000		
Tobacco	95.5	69.3

Source: 1982 Census of Agriculture, Vol. 1, part 51, table 49

Tradeoffs between enumerating the smallest producers and reducing variances of data items within the survey universe could be made more explicitly than at present By specifying the universe in terms of output percentages, the definition of a producer remains comparable over time, regardless of variation in aggregate commodity production, commodity prices, or general price levels

"Primary agricultural producer" is intended to be an economic concept Only production or financial data germane to analyses of the organizational entity, which could be any person, firm, organization, or separable organizational component, would be collected Measures that confuse the boundaries between households and production units, or that intermingle personal and firm attributes would be dropped unless required for a specific analytical purpose

Geographic coverage would be determined by the number and spatial distribution of producers and desired precision levels for the enumerated items Assuming current FCRS funding levels, coverage goals might extend to some, but not all, crop-reporting districts in major agricultural States

Information about primary producers would be collected annually by the FCRS (renamed the "Producer Cost and Returns Survey," or PCRS) Present coverage by the FCRS, in aggregate, is capable of meeting a relatively high threshold The 1987 survey was based on 24,000 survey contacts which yielded a 73-percent completion rate (19) The 1987 survey accounted for 77 percent of the total number of farms officially

reported by USDA, with most of the difference between official farm numbers and FCRS estimates attributed to an undercount of farms with less than \$10,000 in annual gross sales⁵

Role for the Census of Agriculture

What becomes of the census of agriculture with the PCRS? One option would be to continue the census using current definitions and procedures. This would assure county-level coverage and continuity with historical data but would also perpetuate the notion of a "farm" inconsistent with the concept of a producer⁶. Another would be to align the census with the concept and universe of the PCRS. Although there is substantial overlap, the current FCRS mainly measures costs and other financial aspects of farm production, while the census primarily measures physical assets, production inputs, and outputs. Because production processes tend to be more stable than financial processes, the combination of an annual PCRS and a periodic census survey of production parameters could yield a more comprehensive data system for agricultural producers than either survey alone. Still, I question if focusing both the PCRS and census on agricultural producers is the best use of data resources.

The county-level detail available from the census of agriculture is valuable to many users. However, county data are increasingly compromised by efforts to avoid disclosure, the 1982 Census encountered disclosure problems extending to a number of data items at the State level (6). The continued usefulness of county data, especially for aggregate economic or policy analysis, may be questioned. Is statistically acceptable coverage of all counties with any agricultural activity, no matter how limited, cost effective from a Federal perspective?

Many users view the census of agriculture as an indispensable source of economic and demographic information about rural people. A specific concern for these users likely will be that a PCRS, by deliberately excluding small producers and by treating farming solely as an economic enterprise, cannot fully reflect the unique cultural and social institutions surrounding agriculture. To retain the census of agriculture on

⁵For the 1985 FCRS, the coefficient of variation for the national estimate of 1.55 million farms was 1.93 percent (17). Regional coefficients of variation for farm numbers ranged from 3.25 percent in the Corn Belt to 8.24 percent in the Pacific States. Coefficients of variation for less frequently encountered items in an FCRS can be quite large, and State level reliability for minor items may be expensive to obtain.

⁶Allen and Pautler argue that the census provides a reliability check for the more specialized NASS surveys, that data quality is an implicit benefit of duplication, and that having both sources "stimulates reviews of statistical procedures" (2).

these grounds, however, would seem to require more harmony in defining "rural" and "farm" than now exists. Considering the minority position of farmers in most areas of the Nation (27 percent of the U.S. population resides in rural areas but only 8 percent of the rural population actually resides on farms), relying on census of agriculture data to measure social or environmental phenomena gives a distorted view of rural economies. A \$1,000 sales threshold may be entirely arbitrary in many areas in distinguishing farms from other rural households that also contribute to rural economies and serve as "custodians of rural landscapes, communities, cultures, institutions, and values" (14).

A Rural Resource Paradigm?

The nature of a rural paradigm is much less clear than that of a PCRS (7, 8). The 1972 AAEA committee report concluded "The very notion of rural needs to be evaluated in a conceptual sense." In his review of the committee report, Lee commented:

One reaction is that the committee report has more to say that is useful about food and fiber industry statistics than about people and social statistics. Perhaps this merely reflects the fact that we have a system of industry statistics that we criticize and get specific about. We do not even have that to start with on the people side. Furthermore, the latter subject is probably more complex and certainly more diverse, thereby increasing the difficulty of conceptualization and of a systematic approach (15).

A 1987 ERS report to the U.S. Senate Appropriations Committee noted the difficulty of defining rural issues in a world where the rural economy has become an integral part of national and global economies (25).

The primary information needs about rural people and rural activities would seem to be the same as for urban areas notwithstanding the conceptual difficulties of defining rural. A rural paradigm, therefore, might build on existing demographic, business, and local government surveys and censuses of the Department of Commerce. Funding for the current census of agriculture could be redirected to supplement other annual or special census surveys in rural areas, or to add additional questions on the long-form decennial population census about issues of relevance to both urban and rural citizens, such as commuting patterns or multiple jobs.

"Rural" suggests two identifying characteristics geographic space and ties to natural resources Income, employment, health, education, and social concerns of rural people largely parallel those of urban dwellers These concerns may be compounded by factors of distance and population density Economic dependence on natural resources still characterizes many rural areas, although relationships may be weakening (5) And, frequently, use of natural resources in rural areas is central to broad environmental degradation or protection concerns Thus, the key to a rural data paradigm may be better coordination of existing demographic, resource, and institutional information A promising development is geographic reference systems (20) For the 1990 Census of Population and Housing, the Bureau of the Census and the US Geological Survey are implementing a "Topographically Integrated Geographic Encoding and Referencing" (TIGER) system, which promises to provide a useful framework for integrating spatial measures with census information on population, housing, income, and resource use (16)

USDA is a logical focus for natural resource data collection related to rural areas Present legislative mandates to USDA include Section 302 of the Rural Development Act of 1972, Section 5(A) of the Soil and Water Resources Conservation Act of 1977, and Section 3 of the Forest and Rangeland Renewable Resources Planning Act of 1974 (13)⁷ Responsibilities for carrying out this legislation currently fall to the Soil Conservation Service and Forest Service Data collection might usefully be transferred to National Agricultural Statistics Service as a building block for a comprehensive rural resource data base NASS experience with area frame sampling would be advantageous for resource-based surveys NASS has also entered into a long-term agreement with the National Aeronautics and Space Administration to develop further data applications of remote-sensing technology

Conclusions

The economics and statistics professions have largely failed to address charges of conceptual obsolescence raised 16 years ago by the AAEA Committee on Economic Statistics Present agricultural data systems convey the appearance of duplication and waste of

⁷Section 302 authorizes a continuing land inventory and monitoring program including identification of prime farmland, studies and surveys of erosion and sediment damage, flood plain identification and use, land use changes and trends, and environmental degradation Section 5(A) directs the Secretary of Agriculture to conduct a continuing appraisal of soil, water, and related resources, and also authorizes special purpose inventories Section 3 directs the Secretary to conduct comprehensive surveys and analyses of present and prospective conditions of renewable resources, forest, and rangeland

survey resources For these reasons, revision in agricultural and rural resource data systems should command high priority Perhaps the greatest strength of the collaboration between NASS and ERS has been their joint assumption of responsibility in developing the FCRS The design and administration of a PCRS seems a reasonably straightforward extension of procedures already established for the FCRS Prospects for a rural data paradigm seem much less certain, but a framework for such a paradigm exists in current efforts to integrate population and resource data within a geographic reference system

References

- 1 Ahearn, Mary, and Helen Jensen "Concepts and Measurement Issues in the Well-being of Farm Operators and Their Households" Paper presented to the Southern Economics Association, Nov 22-24, 1987, Washington, DC
- 2 Allen, Rich, and Bud Pautler "Current Statistics and Agriculture Census," *Choices* 1st quarter, 1988
- 3 American Agricultural Economics Association, Committee on Economic Statistics "Our Obsolete Data Systems New Directions and Opportunities," *American Journal of Agricultural Economics* Vol 54, 1972, pp 867-75
- 4 Baum, Kenneth, and James D Johnson "Micro-economic Indicators of the Farm Sector and Policy Implications," *American Journal of Agricultural Economics* Vol 68, 1986, pp 1, 121-29
- 5 Bender, Lloyd D, and others *The Diverse Social and Economic Structure of Nonmetropolitan America*. US Dept Agr, Econ Res Serv RDRR-49, Sept 1985
- 6 Bernat, G Andrew, Jr "Farmland Ownership and Leasing in the United States, 1982" US Dept Agr, Econ Res Serv Staff Rept. No AGES870225, May 1987
- 7 Bonnen, James T "Assessment of the Current Agricultural Data Base An Information System Approach," *A Survey of Agricultural Economics Literature* (ed Lee R Martin, George G Judge, and others) Vol 2 Minneapolis Univ of Minnesota Press, 1977, pp 386-407
- 8 Bonnen, James T "Improving the Data Base," *Agricultural and Rural Areas Approaching the*

- Twenty-first Century Challenges for Agricultural Economics* (eds James Hildreth, Katherine Lipton, Ken Clayton, and Carl O'Connor) Ames Iowa State Univ Press, 1988, pp 452-83
- 9 Bonnen, James T "Improving Information on Agriculture and Rural Life," *American Journal of Agricultural Economics* Vol 57, 1975, pp 753-63
 - 10 Bonnen, James T "The Status of Agricultural Data Systems as the Basis for Policy," in proceedings of symposium on "Relevance of Agricultural Economics Obsolete Data Concepts Revisited," AAEA annual meetings, East Lansing, MI, 1987
 - 11 Carlin, Thomas A , and John Crecink "Small Farm Definition and Public Policy," *American Journal of Agricultural Economics* Vol 61, 1979, pp 933-39
 - 12 Carlin, Thomas A , and Charles R Handy "Concepts of the Agricultural Economy and Economic Accounting," *American Journal of Agricultural Economics* Vol 56, 1974, pp 964-75
 - 13 Holmes, Beatrice H "Legal Authorities for Federal (USDA), State and Local Soil and Water Conservation Activities Background for the Second RCA Appraisal" U S Dept Agr , Soil Cons Serv Sept 1987
 - 14 Horsfield, Jim "Our Farms as a National Park We Need Farmers to Mantain It," *Choices* Third quarter, 1986
 - 15 Lee, John E , Jr "Discussion," *American Journal of Agricultural Economics* Vol 54, 1972, pp 875-77
 - 16 Marx, Robert W "The Tiger System Automating the Geographic Structure of the United States Census," *Government Publications Review* Vol 13, Oxford, England Pergamon Press, 1986, pp 181-201
 - 17 Mayer, Leo V , and J Dawson Ahalt "Public Policy Demands and Statistical Measures of Agriculture," *American Journal of Agricultural Economics* Vol 56, 1974, pp 984-88
 - 18 Morehart, Mitchell J *Farm Operating and Financial Characteristics, 1985* U S Dept Agr , Econ Res Serv SB-762, Feb 1988
 - 19 Morehart, Mitchell J , James D Johnson, and David E Banker *Financial Characteristics of U S Farms, January 1, 1988* U S Dept Agr , Econ Res Serv AIB 551, Oct 1988
 - 20 National Research Council *Procedures and Standards for a Multipurpose Cadastre* National Academy Press, Washington, DC, 1983
 - 21 Reinsel, Edward I (ed) Proceedings of symposium on "Relevance of Agricultural Economics Obsolete Data Concepts Revisited" AAEA annual meetings, East Lansing, MI, 1987
 - 22 Schertz, Lyle P "Toward Consensus in Adopting Improved Data Concepts," in proceedings of symposium on "Relevance of Agricultural Economics Obsolete Data Concepts Revisited" AAEA annual meetings, East Lansing, MI, 1987
 - 23 _____ "Households and Farm Establishments in the 1980's Implications for Data," *American Journal of Agricultural Economics* Vol 64, 1982, pp 115-8
 - 24 Stanton, B F "The Quest for Improved Agricultural Data Concepts and Measurement," in proceedings of symposium on "Relevance of Agricultural Economics Obsolete Data Concepts Revisited" AAEA annual meetings, East Lansing, MI, 1987
 - 25 U S Department of Agriculture, Economic Research Service *Rural Economic Development in the 1980's A Summary* AIB-533, Oct 1987
 - 26 U S Department of Commerce, Bureau of the Census "United States Data," *1982 Census of Agriculture* Vol 1, Pt 51, 1983
 - 27 Weeks, Eldon E , Gerald E Schluter, and Leland W Southard "Monitoring the Agricultural Economy Strains on the Data System," *American Journal of Agricultural Economics* Vol 56, 1974, pp 976-83