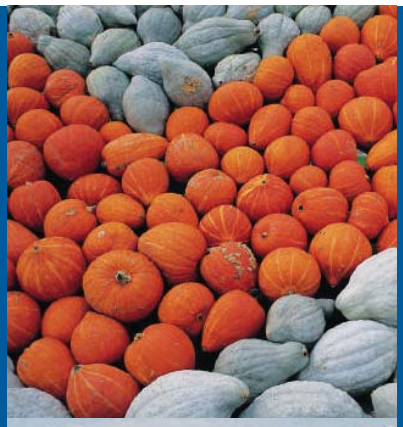

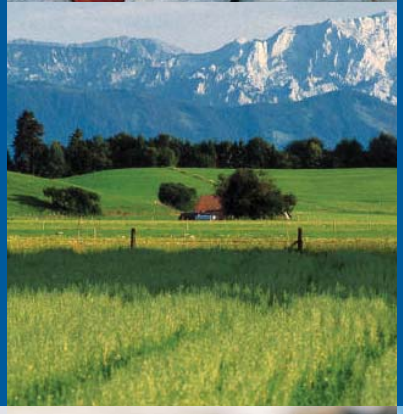

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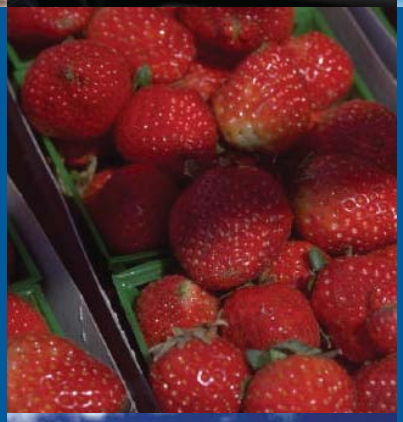
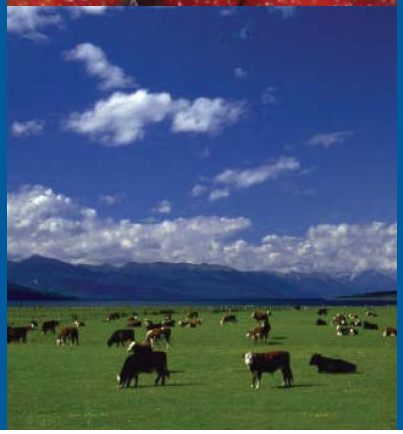




2002 Symposium

Public Information and the Food and Agricultural System

Good decisions depend upon good analysis. Good analysis depends upon good data. And while the data and analysis available to public and private agricultural decision makers in the United States are the best in the world, changes-from biotech to industrialization, from environmental sensitivity to trade-are shifting our data and information needs.

This report summarizes presentations made at the November 6, 2002 symposium sponsored by the Council on Food, Agricultural and Resource Economics (C-FARE) examining some of those data and information needs. Its focus: the availability, quality, and use of data.

How Breakthroughs in Information Systems Impact Local Decisions

Bruce Babcock, Iowa State University

Agricultural-related water pollution is one area in which better data and better models are critical to making better decisions. In many places, agriculture is the main source of water pollution. Dealing with the problem, however, is hampered by heterogeneity. Two examples illustrate how.

Pinpointing Pollution Sources in Texas

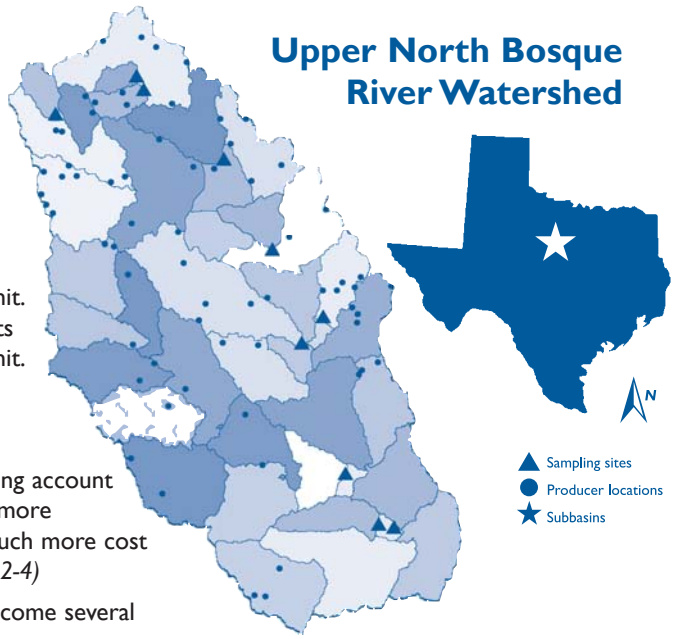
Because pollution contribution may vary dramatically from farm to farm, pinpointing and fixing the problem is difficult. Without disaggregated data on pollution contribution, farmers have "plausible deniability" of responsibility.

In the Upper North Bosque River watershed near Waco, Texas, dairy farms were suspected of polluting the local water supply. No one could be sure, however. By measuring the application of manure to fields and the uptake capacity of the soil at various points in the watershed, researchers were able to show that dairies were, in fact, major contributors to water quality problems. Furthermore, they discovered that the only feasible options were to haul manure out of the watershed or to expand acreage of applications fields. As a result of the study, the Texas Natural Resource Conservation Commission adopted a new total maximum daily load (TMDL) that is 50 percent below current phosphorus levels. And everyone now sees that there is a tradeoff between water quality and dairy profits. *(please see figure 1)*

Allocating the Costs of Pollution Mitigation in Iowa

Another problem lies in allocating the costs of pollution mitigation: large variations in pollution quantity lead to large variations in the cost of prevention. In Iowa's Upper Maquoketa Watershed efforts to mitigate pollution from agricultural run-off were based on the assumption that each farm contributed equally to the problem and the cost of mitigation was thus shared equally. The result was an inefficient use of clean-up dollars. What was needed instead was a way to target corrective measures where they could do the most good for the least cost.

The way to illustrate this is with an example. Suppose 10 farmers produce different levels of pollution. The average contribution is 5.5 units. Mitigation costs $1000 per farmer. A farmer producing only two units of pollution pays $1000, or $500 per unit. A farmer producing 10 units pays $1000, or $100 per unit. For the same amount of money, the second farmer eliminates five times more pollution than the first. Taking account of the variation eliminates more pollution per dollar; it is much more cost effective. *(please see figures 2-4)*



From these two examples, come several lessons:

- Must to know. Absent the desire of producers and others in the region to know which operations are contributing to pollution, nothing can really be done.
- Must have resource and times. Collecting needed data and constructing models takes time and money.
- Must have unbiased scientists. Objectivity, it should go without saying, is absolutely critical.
- Must have baseline data. Data is needed on such things as agricultural practices in use, climate, stream flows, topography, other non-point and point sources of pollution, and water quality.
- Must have models. These models include crop growth and nutrient utilization, movement of nutrients off of farm fields towards streams, and movement and degradation of nutrients in streams.

When these "must haves" are met, solutions can be achieved.

Figure 1 | **Cost per Unit of Pollution Prevented**

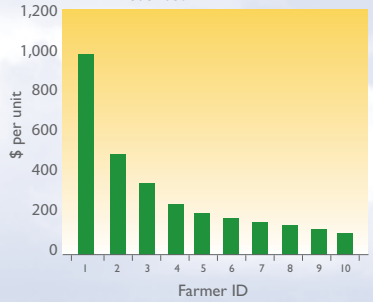


Figure 2 | **Units of Pollution for Each Farmer**
(average pollution = 5.5 units per farm)

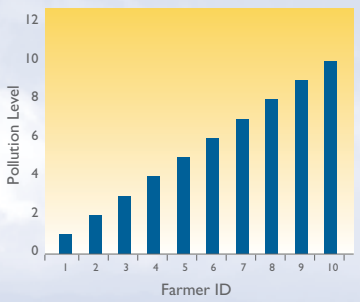


Figure 3 | **Average Cost of Cleanup if Least Cost Sources Cleaned Up First**

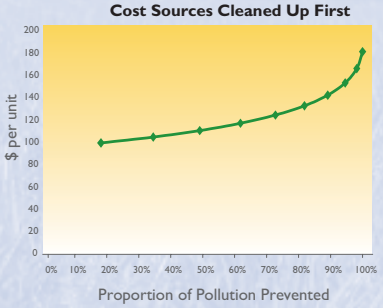
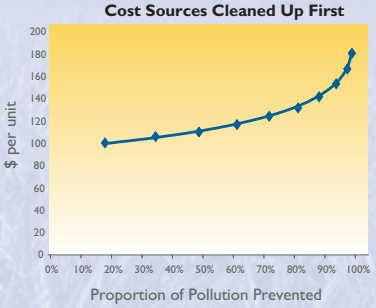
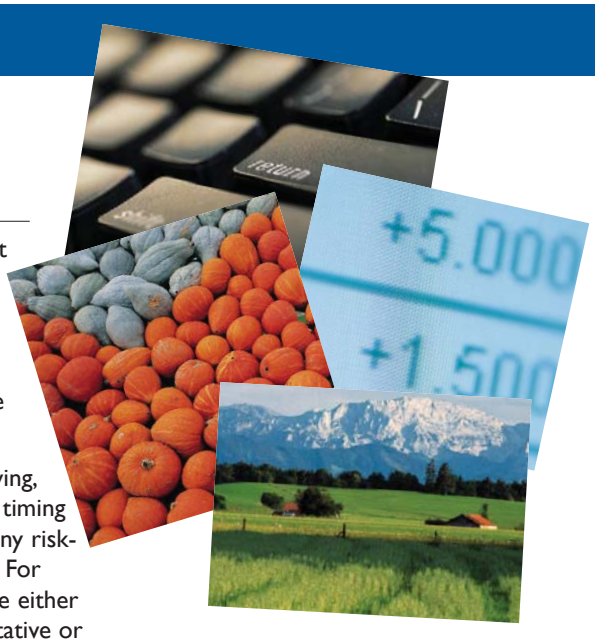


Figure 4 | **Average Cost of Cleanup if Least Cost Sources Cleaned Up First**



An Overview of Public Information and the Agriculture and Food System

Richard Just, University of Maryland



Changing Needs

Structural changes in agriculture and agribusiness over the last few decades have shifted our information needs. Agriculture today is far different than it was fifty years, ten years, or even one year ago. Changes are afoot in all aspects of the industry, changes which alter the information needs of producers, processors, marketers, consumers, and, of course, the policymakers that seek to balance the needs of all the others.

Those changes include:

- increasing industrialization of agriculture;
- growing importance of off-farm income to farmers;
- expanding reach of biotechnology;
- heightening concern for environmental impacts;
- growing importance of alternative agriculture and niche markets;
- evolving contractual relationships;
- expanding information technology; and
- increasing consolidation of agribusiness.

These changes highlight shortcomings in the availability, quality, and use of existing data, particularly in the formative stages of policymaking-when needed most. And those shortcomings will only get worse, given the changes affecting agriculture, unless we act to overcome them.

The Problem of Heterogeneity

Chief among the shortcomings is the problem of heterogeneity (dissimilar farms and farmers)-in which the aggregation of data (due to a lack of data which, in turn, is often due to concerns about confidentiality) mask important differences among individuals and, thus, fail to reflect distributional effects of policies. Specifically, heterogeneity causes standard theory to fail at the aggregate level if left unaccounted for, which explains why many models do not predict; and lead to false implied policy/welfare impacts.

Heterogeneity comes into play in a variety of ways.

Spatial Allocation (of inputs to crops). Models can study only aggregate production possibilities. As a result, models admit nonsensical possibilities such as increased fertilizer application on wheat land increasing corn yields. Indeed, the necessary aggregation conditions are dubious and therefore prevent meaningful policy analysis.

Temporal Allocation (planting, growing, and harvesting). Data do not include timing of input applications even though many risk-reducing inputs are stage-dependent. For example, pesticide applications can be either pre-emergent and preventative or post-emergent and prescriptive. As a result, models cannot discern motivations (e.g., risk aversion vs. profit maximization).

Statistical Distribution (variation not only average). When models are forced to use only averages, and not account for variation in the data, their usefulness is limited. Without data on variation, models must, for example, assume identical farms and circumstances-clearly a false assumption.

Correlation of Multifunctional Attributes. Local correlations of multifunctional characteristics-productivity, erodability, environmental sensitivity-are critical to policy impacts. Yet data collection has tended to measure sets of characteristics independently, so that data do not allow linking observations by location.

Capital Stock and Long-Term Behavior. The agricultural risk that really matters is risk of farm failure-the lesson of the 1970's boom followed by the 1980's debt crisis. Capital investment and replacement is the key. Yet we have no data on capital vintages, retirement, salvage, and have only crude or inaccessible data on debt, equity, and wealth. There is also little study of long-run preferences and behavior. Farmers' willingness to trade annual variability for serial correlation of profits is not understood.

Financial Structure and Off-farm Activity. Most farmers' major occupation is not farming. Production behavior is affected by financial constraints and may be motivated by consumption preferences (smoothing of risk). Hobby farming may be a consumption activity.

Building Better Models/Better Understanding

As a result of data shortcomings, there is a tendency toward reduced-form estimation. And while appropriately restricted reduced forms relieve data requirements, they result in the estimation of outcomes without understanding the underlying "how". We cannot learn basic properties of technology or preferences with reduced form models. Also, estimated reduced form models become irrelevant when policies change.

Instead, we need to be able to capture "deep structure":

- production structure (allocation to technologies);
- behavior given technology and financial structure;
- structure of institutions and markets;
- change in internal structure vs. exogenous factors; and
- policy- and behavior-relevant aggregation.

And to do that, of course, will require that researchers in academia, government, and the private sector have broad access to new, more detailed data than are currently available.

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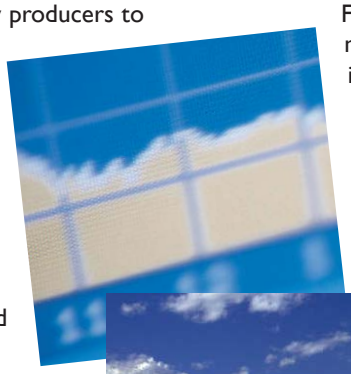
Data, Structural Change, and Public Policy: The Case of Mandatory Livestock Pricing

Ted Schroeder, Kansas State University

The Livestock Mandatory Reporting Act was enacted into law October 1999 and became operational April 2001. Its objective: provide information to better reflect the overall supply and demand situation of the marketplace and allow producers to better determine prevailing market prices, conditions, and arrangements pertinent to the marketing process.



The Act requires beef, pork, and lamb processors of specified slaughter volume to electronically report details of all transactions of livestock purchases and wholesale trade (beef and lamb only) twice daily to USDA. It also calls for monthly retail meat price and margin reporting. USDA then summarizes and reports the information to avoid disclosing confidential information.

The Act is an expensive endeavor-one that was supported by producer associations and opposed by packer associations. It came about because the old, voluntary reporting system was no longer sufficient and people demanded change. Signals about what consumers wanted were not being sent up the supply chain, and therefore consumers walked away from the product. Demand dropped. To get clearer demand signals to producers, the beef industry began to base prices of cattle on the merit of individual carcasses. In doing so, they developed marketing agreements often using formula pricing arrangements and abandoned traditional cash markets that were the essence of USDA voluntary market reports. As a result, daily price reporting became spotty-many days there were no reports. Further, USDA did not have a method in place to collect price information for cattle sold using marketing agreements as these private contractual relations were not under the purview of the USDA market reporters. Mandated reporting became inevitable.

Now that the Act is in operation, its effectiveness and especially its market impact is less than some had hoped. First, early estimates of what it would cost the packers were too low. Smaller packers have realized higher costs per head than USDA estimated prior to implementation. In addition, the initial confidentiality guidelines resulted in less frequent reports than under the old voluntary system-though this has now been corrected. Finally, the timeliness of reports has raised concerns.

Still, the Act eliminated selective reporting bias, and increased price information should:

- reduce packer costs of information;
- reduce producer uncertainty about terms of trade;
- inform otherwise uninformed participants;
- improve production efficiency; and
- enhance the price discovery process.

In hindsight, more advance analysis should have been conducted prior to the policy enactment. Letting emotional appeals take over reasonable policy assessments is not the way to go. Policy should not simply react to loud appeals for change. Policy does not have to be quite as experimental.

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C-FARE is a non-profit and non-partisan professional organization working to bring the results of economics research to key public sector decision makers in the Administration and the Congress.

Improving Date, Improving Policy, Improving Lives

Impressive as our data and information systems are, they could be better. Changes in the food and agricultural sector, in fact, demand improvement in our analytic capacity just to keep pace. Improvements in data can have significant positive impact and lead to better decisions, public and private.

Specifically, data must be

- available--on emerging subjects such as nontraditional markets and at an appropriate level of detail so as to avoid the problems of heterogeneity;
- high quality-telling not only an accurate story, but also the complete story;
- useable--accessible by a wide range of researchers, publishable (not unduly constrained by confidentiality concerns), compatible with other data, and transparent (capable of being understood, replicated, and verified by other researchers).

Improvements to our public information system, of course, cost money. The return on the investment, however, is significant: improving understanding, improving policy, improving the lives of both producers and consumers. C-FARE and its members stand ready to help achieve those improvements.

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Tom Rowley, *Writer*