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A Tale of Two Reports

By:

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In October 1989 the NAS/NRC released *Alternative Agriculture*, a 448-page analysis of problems confronting the agricultural system and the potential contributions of sustainable and organic agriculture in addressing economic, environmental, animal welfare, and food safety and quality issues.

On June 29, 2010, the NAS/NRC released another major report on essentially the same topic that, among other things, revisited the findings, conclusions, and recommendations of the 1989 report. *Toward Sustainable Agricultural Systems in the 21st Century* is the product of a nearly three year process. The fifteen-member committee met thirteen times from December, 2007 through November, 2009.

Like all NAS/NRC reports, the *Toward Sustainable Agricultural Systems* report (hereafter *TSAS*) is a consensus document. Its content and recommendations are bounded by what a diverse group of well-informed and strong-willed people could agree on.

Two people served on both the 1989 and 2010 report committees – Dr. Richard Harwood of Michigan State University and Dr. Sandra Batie, also of MSU. Dr. R. James Cook of Washington State University is the third individual who played a prominent role in the completion of both reports. Dr. Cook oversaw the rigorous NRC report review process for both reports.

If the time required completing the review process is a reliable indicator of which report stirred up the most controversy among reviewers, *Alternative Agriculture* clearly earns that distinction. The new report was released about a year after a complete draft was submitted for review, whereas in the case of *Alternative Agriculture*, the review, revision, and approval process took well over two years.

Defining of "Sustainable Agriculture"

Many people have murmured under their breathe during meetings, and some have openly stated that "…sustainable agriculture is like beauty, it is in the eyes of the beholder." The definition of "sustainable agriculture" has evolved over the years, emphasizing different goals and aspects of farming system management, but the same basic themes are addressed in all definitions. Some definitions are more precise and complete than others. In general, the more disagreement in a roomful of people seeking to define "sustainable agriculture," the more general and imprecise the language emerging from the dialogue.

The 1989 report defined "alternative agriculture" as –

"…any system of food and fiber production that systematically pursues the following goals:

- More thorough incorporation of natural processes such as nutrient cycling, nitrogen fixation, and pest-predator relationships into the agricultural production process;
- Reduction in the use of off-farm inputs with the greatest potential to harm the environment or health of farmers and consumers;
- Greater productive use of the biological and genetic potential of plant and animal species;
- Improvement of the match between cropping patterns and the productive potential and physical limitations of agricultural lands to ensure long-term sustainability of current production levels; and

- Profitable and efficient production with emphasis on improved farm management and conservation of soil, water, energy, and biological resources."

"Alternative agriculture is not a single system…"

"The hallmark of an alternative farming approach is not the conventional practices it rejects but the innovative practices it includes." (Executive Summary, pages 3 and 4).

The definition of "sustainable agriculture" in the 2010 report differs greatly from the 1989 definition of "alternative agriculture," a term that was always intended by the *Alternative Agriculture* Committee to mean essentially the same thing as "sustainable agriculture." The *TSAS* report does not offer a formal definition of "sustainable agriculture," and instead identifies –

"…four generally agreed-upon goals that help define sustainable agriculture:

- Satisfy human food, feed, and fiber needs, and contribute to biofuel needs.
- Enhance environmental quality and the resource base.
- Sustain the economic viability of agriculture.
- Enhance the quality of life for farmers, farm workers, and society as a whole."

"Sustainability is best evaluated not as a particular end state, but rather as a process that moves farming systems along a trajectory toward greater sustainability on each of the four goals."

Differences in the above two definitions of "alternative" or "sustainable" agriculture are striking. The 1989 report's definition is more specific and comprehensive than the "four goal" based definition. The 1989 definition states that the goals of alternative agriculture include reducing the use of high-risk or environmentally damaging inputs, a goal not dropped in the 2010 definition. Likewise, the 1989 definition highlights the need to match cropping patterns and farming enterprise choices to the physical limits of the land, given local soils and climate, a goal not mentioned in 2010.

The 2010 *TSAS* articulation of sustainable agriculture goals includes one not addressed in 1989 – satisfying human food feed and fiber needs, while contributing to biofuel needs. No doubt the extension of the goals for sustainable agriculture to encompass biofuel production triggered considerable discussion within the committee, and will be among the novel statements in the report that triggers debate.

Key Findings

Based on its assessment of then-current conventional and alternative farming practices, the 1989 report committee "arrived at four major findings" –

1. A small number of farmers are practicing alternative agriculture and derive "significant and sustained economic and environmental benefits."
2. A wide range of federal farm, conservation, and regulatory policies "significantly influence farmers' choices of agricultural practices. As a whole, federal policies work against environmentally benign practices and the adoption of alternative agriculture systems..."
3. A systems approach to research is needed to advance the effectiveness and profitability of alternative agriculture, and agriculture as a whole; and
4. Farmer-innovators are driven the development and adoption of alternative agricultural systems, but the government needs to help to make wider adoption feasible.

The 2010 *TSAS* report does not offer a set of findings comparable to the 1989 report. Material throughout the report, however, reinforces these findings without ever stating them as directly as the 1989 report. *TSAS* offers several key conclusions, however, that track closely the findings from the 1989 report.

Key Conclusions

The 1989 report offers twelve highlighted, italicized conclusions (see pages 8-17). Each is a clear, definitive statement of the significance of one or more finding presented elsewhere in the report, focusing on the outcomes likely to follow adherence to conventional farming systems and technology, as opposed to "alternative agriculture." In short, these 12 conclusions sought to articulate what the committee felt was at stake as the nation considered whether, how, and to what extent policy changes should be put in place to steer American agriculture in a different direction.

Four conclusions focus on the performance of alternative farming systems. In short, the committee concluded that –

1. Alternative farming systems "work" and can be productive and profitable;
2. There is great variability in alternative farming systems;
3. Alternative farming systems "almost always use less synthetic chemical pesticides, fertilizers, and antibiotics per unit of production than comparable conventional farms" and this lowers costs, risks, and environmental impacts;
4. Alternative farming systems "typically require more information, trained labor, time, and management skills…"

Four more conclusions address the impact of government policies and emphasize that –

5. Federal policies discourage and penalize core alternative agricultural practices and "…sometimes encourage unrealistically high yield goals, inefficient fertile and pesticide use, and unsustainable use of land and water."
6. "Fertilizers and pesticides are often applied at rates that cannot be justified economically…"
7. Federal food grading standards "often discourage alternative pest controls…" and promote production of high-fat animal products;
8. Current pesticide policy applies a stricter standard to new, relatively safer pesticides than to old ones that pose even greater risks, but remain on the market for lack of alternatives.

The last four conclusions address "The State of Research and Extension" within the land grant university system and federal science agencies, in particular USDA –

9. Disciplinary research is not sufficiently integrated and is not likely to find solutions major agricultural system problems and challenges;
10. Alternative agriculture research and extension funding is inadequate;
11. "There is inadequate scientific knowledge of economic, environmental, and social costs and thresholds for pest damage, soil erosion, water contamination, and other environmental consequences of agricultural practices" and such knowledge is needed to identify and deal with tradeoffs between goals;

12. Public and private sector researchers "should give higher priority to development and use of biological and genetic resources to reduce the use of chemicals, particularly those that threaten human health and the environment."

The 2010 *TSAS* report does not offer a similar set of distinct conclusions, and instead uses a series of highlighted passages that usually begin with the words "The committee concluded that…" or similar words. In Chapter 9, "Conclusions and Recommendations" are set forth.

The main conclusion in the 2010 report is that to meet the demands of the 21st century under conditions of climate change, declining resource availability, and competition for land and water, "…agricultural production will have to substantially accelerate progress toward the four sustainability goals."

Other key conclusions are that –

- "Sustainability is best evaluated not as a particular end state, but rather as a process…"
- Both incremental and transformative change is needed to accelerate progress toward the four sustainability goals.
- "Research on the economic and social dimensions of agricultural sustainability is scarce…"
- "The transformative approach to improving agricultural sustainability would dramatically increase integrative research…"
- "The report *Alternative Agriculture* emphasized the importance of a systems approach to agricultural research 20 years ago, yet the proportion of long-term systems agricultural research remains small."
- A landscape approach to agricultural research is needed but "programs to encourage such research do not exist."

It is hard to imagine how anyone could argue with the above conclusions stated in the *TSAS* report. Near universal agreement with these conclusions, however, will not necessarily translate into coherent and systemic policy and research changes since the committee left so much room to interpret what sorts of technologies and production systems are compatible with the four generic "sustainable agriculture" goals. Without doubt, proponents of organic farming and genetic engineering, for example, will find plenty of room to maneuver within the "sustainable agriculture" framework set forth in the 2010 report.

Recommendations

Fourteen recommendations were advanced in the *Alternative Agriculture* report, roughly tracking the 12 conclusions. Several contain multiple "action items" and policy initiatives. For example, one of the recommendations under "Regulatory Change" states that –

"*Public information efforts should explain to consumers the relationship of appearance to food quality and safety. Alternate means of controlling the supply and price of fruits and vegetables should be developed. Cosmetic and grading standards should be revised to emphasize the safety of food and deemphasize appearance and other secondary criteria*." (Page 19)

Changes were called for in commodity and conservation programs to promote crop rotations and the integration of cropping and livestock in mixed farming systems. Specific suggestions were made

to relax or remove constraints to biological control and Integrated Pest Management (IPM). Adjustments in regional cropping patterns to better match soil-climatic conditions were called for, when needed to promote profitability and environmental quality.

Research recommendations called for at least $40 million in annual USDA support of alternative agriculture research – a level still not reached. Three "Economics and Markets" recommendations focused on the need for better information on the performance of different farming systems, so that policymakers will have more reliable and insightful data to draw upon in evaluating the impact of past and current polices, and projecting and monitoring the impacts of new policies.

The *TSAS* report offers six recommendations that track that report's major conclusions, just as in the case of the *Alternative Agriculture* report. In short, the 2010 report recommends that –

- USDA and state agricultural institutions "should continue publicly funded research and development (R&D) of key farming practices for improving sustainability…"
- Integrated research and extension programs should be "aggressively" funded that "focus on interactions among productivity, environmental, economic, and social sustainability outcomes."
- USDA, EPA, NSF, land grant universities, and farmer-led sustainable agricultural organizations should develop a long-term research and extension initiative that studies the "aggregate effects of farming at a landscape or watershed scale…" to better progress toward the four sustainability goals.
- Farmer-participatory research approaches should be encouraged and supported.
- USDA should invest more resources in studying the ways current and proposed market structures, policies, and "knowledge institutions" create opportunities or barriers to progress toward sustainable agriculture.
- Agencies and foundations supporting agricultural development work in developing countries should emphasize a systems approach, adaptability, and expanding market access.

Differences Between the Reports

The 1989 *Alternative Agriculture* report is, in general, more direct, specific, and hard-hitting when addressing the consequences and impacts of then-conventional production practices, and in projecting the likely benefits of alternative farming systems. Compared to the 2010 *TSAS* report, the 1989 report's major findings, conclusions, and recommendations are also more concrete and specific, while the conclusions and recommendations in the *TSAS* report are more conceptual and goal-oriented.

The 2010 *TSAS* report says relatively little in its Executive Summary about food quality and safety, and almost nothing about animal welfare and health issues, whereas these aspects of agricultural system performance are addressed in some detail in *Alternative Agriculture*.

The Role and Impact of Research

The *TSAS* report committee places great confidence in the role of research and science in bringing about change. There is an unstated presumption embedded in the report's conclusions and recommendations that if more systems-oriented, integrative research is done, producing deeper insights in the impacts of farming systems and practices on the four goals of agricultural sustainability, that these insights will trigger change.

A review of the impacts of the agriculture, food quality, and food safety research over the last twenty years suggests otherwise. Evidence has mounted for 20 years supporting the now-consensus scientific position that subtherapeutic use of antibiotics in livestock agriculture for growth promotion and disease prevention contributes to the emergence of antibiotic resistance genes that find their way to human pathogens, triggering harder-to-control infections. No meaningful policy changes have been taken in response to this new science, although both the FDA and Congress are now considering such action.

Many of the primary mechanisms through which pesticides can trigger secondary pest outbreaks and resistance are well understood and the insights gained are broadly applicable and have proven robust in terms of the ability of scientists to predict where and when secondary outbreaks or resistance can be expected. Moreover, clearly, both problems are growing more serious, in part as a result of genetically engineered crops expressing *Bt* endotoxins or rendering corn, soybeans, cotton, or canola resistant to certain herbicides. Despite much excellent science and widely accepted understanding of the factors leading to these problems, there has been very little effort by either the private sector or government to prevent these problems from occurring.

The impact of beef and dairy cattle diet formulation and management on the shedding of *E. coli* O157, and other pathogenic *E. coli*, is reasonably well understood, as are the routes of transmission for dangerous *E. coli* bacteria to leafy greens, other produce, and meat products, and in particular hamburger. Despite the heavy media attention on these issues, and the cost of illness outbreaks to society as a whole, relatively little has been done to translate new scientific insights into either preventive practices at the farm level, or polices designed to expand margins of safety as food moves from the farm, and feedlot, to consumers.

I could go on for far too long citing and explaining other examples where new science and insights do not, or have not yet triggered meaningful changes in how food is produced and processed in the U.S. The *Alternative Agriculture* report placed heavy emphasis on policy changes to encourage positive change and reinforce new research and extension initiatives and insights. The committee's emphasis on the vital role of policy change has been, to a large degree, vindicated in the last twenty years.

Of the major problems highlighted by *Alternative Agriculture*, significant progress has been achieved in only two areas – reducing soil erosion and risks triggered by pesticide residues in food. The former accomplishment was brought about largely through the historic conservation title of the 1990 farm bill and the commitment by Congress in subsequent years to appropriate the substantial sums required to implement the 1990 farm bill's new conservation program, especially the Conservation Reserve Program.

The reduction now evident in pesticide dietary risks associated with domestically grown fruits and vegetables can be directly traced to passage in 1996 of the "Food Quality Protection Act," a major act of Congress that responded fully and effectively to the recommendation in *Alternative Agriculture* to remove the inherent bias in then-current federal pesticide law against newer, safer pesticides. (Another NAS/NRC report issued in 1993 – *Pesticides in the Diets of Infants and Children* – had a far greater impact on the content of the FQPA, and in creating the political support needed for the passage of such controversial legislation).

As noted multiple times in the 2010 *TSAS* report, little or no action was taken in response to several recommendations in the *Alternative Agriculture* report, and as a result, several problems and challenges that were just first emerging in the late 1980s have been allowed to fester and mature, and some have grown into much more complex and costly problems.

Throughout its three years of work, the *TSAS* committee must have had many animated discussions about the roots of today's food safety and quality, environmental, farm economics, and plant and animal health problems, and equally or even more impassioned discussions of the surest path forward toward sustainable solutions. If more of the recommendations in the *Alternative Agriculture* report had been implemented and steadily fine-tuned over the last twenty years, valuable insights and experience would have been gained that would have collectively made the task facing the *TSAS* committee a bit more manageable.

It is worth noting that the general political and ideological climate in which the *TSAS* committee carried out its work was far more divided and contentious than the case in the late 1980s, when the *Alternative Agriculture* committee did its work. Over the 20 years between these two reports, science and technology has produced far deeper, and in some cases more worrisome insights into the problems with American agriculture and our food system. It has also led to the development and commercialization of a much wider array of farm inputs including many new chemicals, animal drugs, plant and animal genetics, machines, practices, and tillage, planting, irrigation, and harvest systems.

One would predict -- and hope -- that today's far bigger farming technology toolkit and our deeper insights into the workings of farming systems relative to the goals of sustainable agriculture would make it easier for institutions, policymakers, the private sector, agricultural leaders, and consumer and environmental advocates to reach agreement on the best way forward, but that has certainly not proven to be the case in recent years. Perhaps the next NAS/NRC report on this important topic should include an assessment of why.