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VIEWS AND REVIEWS
1983-1988

by

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Sustainability is not enough

Vernon W. Ruttan

Abstract. *Traditional agricultural systems that have met the test of sustainability have not been able to respond adequately to modern rates of growth in demand for agricultural commodities. A meaningful definition of sustainability must include the enhancement of agricultural productivity. At present, the concept of sustainability is more adequate as a guide to research than to farming practice.*

Key words: sustainability definition, productivity increase, population growth, income increase, research implications

Any definition of sustainability suitable as a guide to agricultural practice must recognize the need for enhancement of productivity to meet the increased demands created by growing populations and rising incomes. The sustainable agricultural movement must define its goals sufficiently broadly to meet the challenge of enhancing both productivity and sustainability in both the developed and developing world. I will illustrate the problems of achieving these goals with some historical examples.

Ambiguity about technology

The productivity of modern agriculture is the result of a remarkable fusion of science, technology and practice. This fusion did not come easily. The advances in tillage equipment and crop and animal husbandry which occurred during the Middle Ages and until well into the 19th century evolved almost entirely from husbandry practice and mechanical insight. The power that the fusion of theoretical and empirical inquiry has given to the advancement of knowledge and technology since the middle of the 19th century has made possible advances in material well-being that could not have been imagined in an earlier age.

These advances have also been interpreted as contributing to the subversion of traditional rural values and institutions and to the degradation of natural environments. They led, in the 1960s and 1970s, to the emergence of a new skepticism about the benefits of advances in science and technology. A view emerged that the potential power created by the fusion of science and technology is dangerous to the modern world and the failure of the human race.

This ambiguity about the impact of science and technology on institutions and environments has led to a series of efforts to increase the sensitivity of scientists and science administrators and to reform the decision processes for the allocation of research resources. These efforts have typically attempted to find rhetorical capsules which would serve as a banner under which efforts to achieve reforms might march. Among the more prominent have been "appropriate technology," "integrated pest management," "low-input technology" and, more recently, "sustainability."

Reforming agricultural research

It is not untypical for such rhetorical capsules to achieve the status of an ideology or a social movement while still in search of a methodology, a technology, or even a definition. If the reform movement is successful in directing scientific and technical effort in a productive direction, it becomes incorporated into normal scientific or technological practice. If it leads to a dead-end, it slips into the underworld of science often to be resurrected when the conditions which generated the concern again emerge toward the top of the social agenda.

Research on new uses for agricultural products is an example. It was promoted in the 1930s under the rubric of chemurgy and in the 1950s under the rubric of utilization research as a solution to the problem of agricultural surpluses. It lost both scientific and political credibility because it promised more than it could deliver. It has emerged again, in the late 1970s and early 1980s, in the guise of enhancing value added.

The "sustainability" movement, like other efforts to reform agricultural research, has experienced some difficulty in arriving at a definition that can command consistency among the diverse and sometimes incompatible reform movements that are marching under its banner. Those of you who may recall the more populist conservation literature of the 1950s, such as *Topsoil and Civilization* (1955) by Tom Dale and Vernon Carter, or *Malabar Farm* (1947) by Louis Bromfield, will recognize the poetry that has emerged in some of the

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new sustainability literature. Fortunately we can draw on several historical examples of sustainable agricultural systems.

Sustainable agricultural systems

One example of sustainable agriculture was the system of integrated crop-animal husbandry that emerged in Western Europe in the late middle ages to replace the medieval two- and three-field systems (Boserup, 1965). The "new husbandry" system emerged with the introduction and intensive use of new forage and green manure crops. These in turn permitted an increase in the availability and use of animal manures. This permitted the emergence of intensive crop-livestock systems of production through the recycling of plant nutrients in the form of animal manures to maintain and improve soil fertility.

A second example can be drawn from the agricultural history of East Asian wet rice cultivation (Hayami and Ruttan, 1985). Traditional wet rice cultivation resembled farming in an aquarium. The rice grew tall and rank; it had a low grain-to-straw ratio. Most of what was produced, straw and grain, was recycled into the flooded fields in the form of human and animal manures. Mineral nutrients and organic matter were carried into and deposited in the fields with the irrigation water. Rice yields rose continuously, though slowly, even under a monoculture system.

A third example is the forest and bush fallow (or shifting cultivation) systems practiced in most areas of the world in pre-modern times and today in many areas of tropical Africa (Pingali, Bigot and Binswanger, 1987). At low levels of population density, these systems were sustainable over long periods of time. As population density increased, short fallow systems emerged. Where the shift to short fallow systems occurred slowly, as in Western Europe and East Asia, systems of farming that permitted sustained growth in agricultural production emerged. Where the transition to short fallow has been forced by rapid population growth, the consequence has often been soil degradation and declining productivity.

Sustaining and enhancing productivity

This brings me to the title of this paper. The three systems that I have described, along with other similar systems based on indigenous technology, have provided an inspiration for the emerging field of agroecology. But none of the traditional systems, while sustainable under conditions of slow growth in demand, has the capacity to respond to modern rates of growth in demand generated by some combination of rapid increase in population and in growth of income. Some traditional systems were able to sustain rates of growth in the 0.5-1.0 percent per year range. But modern rates of growth in demand are in the range of 1.0-2.0 percent per year in the developed countries. They often are in the range of 3.0-5.0 percent per year in the less developed and newly industrializing countries; rates of growth in demand in this range lie outside of the historical experience of the presently developed countries!.

In searching the literature on sustainability, I do not find sufficient recognition of the challenge that modern rates of growth in demand impose on agriculture. If the concept of sustainability is to serve as a guide to practice, it must include the use of technology and practices that both sustain and enhance productivity.

In the United States, the capacity to sustain the necessary increases in agricultural production will depend largely on our capacity for institutional innovation. If we lose our capacity to sustain growth in agricultural production, it will be a result of political and economic failure. Failure to reform agricultural commodity programs in a manner that will contribute to both sustaining and enhancing productivity will mean the loss of one of the few industries in the United States that has managed to retain world-class status--that is capable of competing in world markets (Ruttan and von Witzke, 1988).

It is quite clear, however, that the scientific and technical knowledge is not yet available that will enable farmers in most tropical countries to meet the current demand their societies are placing upon them nor to sustain the increases that are currently being achieved. Further, the research capacity has not yet been established that will be necessary to provide the knowledge and the technology. In these countries, achievement of sustainable agricultural surpluses is dependent on advances in scientific knowledge and on technical and institutional innovation.

Implications for research

I am deeply concerned that the commitment to support the development of the research capacity in both developed and developing countries that will be necessary to achieve productive and sustainable agricultural systems has been weakening. And I am also concerned that the sustainability movement is pressing for adoption of agricultural practices under the banner of sustainability before either the science has been done or the technology is available.

It has been surprisingly difficult to find careful definitions of the term sustainability. This is at least in part because "sustainability," if it is to provide a useful rhetoric for reform, must be able to accommodate the several traditions that must march under its banner. These include the organic agriculture tradition, the land stewardship movement, the agroecology perspective, and others. In my judgment, any attempt to specify the technology and practices that meet the criteria of sustaining and enhancing productivity would be premature. *At present it is useful to define sustainability in a manner that will be useful as a guide to research rather than as an immediate guide to practice.* As a guide to research, it seems useful to adhere to a definition that would include (a) the development of technology and practices that maintain and/or enhance the quality of land and water resources, and (b) the improvement in plants and animals and the advances in production practices that will facilitate the substitution of biological technology for chemical technology.

Furthermore, it is desirable to generate the knowledge that will enable us to determine what it is possible to achieve in the direction of the above objectives primarily from a biological perspective. Maximum yield experiments represent a useful analogy. The objective of a maximum yield experiment or trial is not to provide a guide to farm practice. Rather it is to find out how a plant population performs under high level input stress. *The research agenda on sustainable agriculture needs to define what is biologically feasible without being excessively limited by present economic constraints.*

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COMMENTARY

Vernon W. Ruttan's Viewpoint

Agricultural Scientists As Reluctant Revolutionaries

Agronomists and other agricultural scientists, along with engineers and health scientists, have been the true revolutionaries of the 20th century. But they are reluctant revolutionaries!

They have wanted to revolutionize technology but have preferred to neglect the revolutionary impact of technology on society. They have often believed that it would be possible to revolutionize agricultural technology without changing rural institutions. They have been pleased to accept credit for reducing the cost of crop and animal production while avoiding the responsibility for lower commodity prices.

The Link Is Overlooked

Because they believe, and with good reason, in the benefits that technical change in agriculture brings to society and to farmers, agricultural scientists often fail to recognize the link between technical change, in which they take pride, and the institutional changes which they either do not perceive or which they fear. As a result, they often react with shock and anger when confronted with charges of responsibility for institutional changes in labor relations, farm structure, commodity markets, or environmental changes such as ground water contamination and the health effects of pesticide use that are induced by technical change.

How should the agricultural science community respond to these concerns? A first step is to recognize that similar economic and social forces have generated both the drive for technical change, leading to the advances in the productive capacity of plants, animals, machines, and men, and the drive for institutional changes designed to achieve more effective management of scientific effort and impact. The increased scarcity of natural resources—land, water, and energy—will continue to create a demand for technologies that generate higher levels of output per worker, per hectare, and per kilo-calorie. The rising value that society places on the health of workers and consumers, and on environmental amenities such as clean water, clear air and clean streets, will continue to lead to a demand for effective social control over the development and use of agricultural technology.

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A Necessary Step

A necessary step in any effective response to public concern about the social impact of technical change is for the research community to agree that *there can be no questions about society's right to hold the science community responsible for the consequences of the technical and institutional changes set in motion by research.* When credit is claimed for the productivity growth generated by advances in agricultural technology, responsibility cannot be evaded for the impact of, for example, pest control chemicals on environmental amenities or on the health of workers and consumers.

Once the right of society to hold its researchers responsible for the effects of the knowledge and technology they provide is accepted, it is then possible to deal with the more tractable question concerning how much responsibility a wise society will impose on its research community.

It is in society's interest to let the burdens of responsibility rest lightly on the shoulders of individual researchers and research managers. If society insists that it be assured that advances in agricultural technology carry minimum risk, and thus that agricultural scientists abandon their revolutionary role, society must accept the risk of losing access to the new income streams generated by technical change.

Society should exercise great care in insisting that research managers and scientists commit themselves to the realization of scientific or technical objectives that are unrealistic in terms of the state of scientific and technical knowledge. For example, it was unrealistic in the 1950s to expect that utilization and marketing research—post-harvest technology in today's terminology—could make a significant contribution to the solution of agricultural surplus problems in the United States. The allocation of excessive research resources to these areas led both to a waste of research resources and to erosion in the credibility of marketing research.

Research managers have a clear responsibility to inform a society of the impact of economic policy on: (1) the choice of mechanical, chemical, and biological technologies by farmers; (2) the incidence of technical change on the distribution of income among laborers, landowners, and consumers; (3) the structure of farming and rural communities; and (4) the health and safety of producers and consumers. They also have a responsibility to enter into the intellectual and political dialogues that are necessary if society is to achieve more effective convergence (1) between market prices and total societal costs—including environmental degradation, and (2) between the individual and revealed preferences of its citizens.

But agricultural research managers have neither sought nor been provided the resources to exercise this responsibility. For example, the competitive grants system administered by the USDA contains no funding for technology or, more broadly, social impact analysis. As a result, research managers often stand intellectually "exposed" before both their constituencies and critics when confronted with questions about the value or impact of their research programs. ■

SCIENCE

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Increasing Productivity and Efficiency in Agriculture

Efforts to enhance agricultural productivity have two major objectives. One is to generate income growth for the producers of agricultural commodities. Another is to make agricultural commodities available to consumers on increasingly more favorable terms.

These two goals have at times appeared to be inconsistent or in conflict. During periods when the growth of productivity has lagged behind the growth of demand, the commodity component of food costs has risen. During periods when demand for agricultural commodities has stagnated, commodity prices have sometimes declined more rapidly than production costs. Yet during most of the last half century both consumers and producers have shared in the economic dividends generated by productivity growth. Consumers in the United States have access to food on more favorable terms than at any time in the past. And most farm families today enjoy a level of living that was not available to earlier generations.

This is not to imply that all is well in rural America or in the nation's agricultural research system. During the last 5 years a global recession and the rising value of the dollar have dampened the demand for U.S. farm commodities abroad and high interest rates have imposed severe financial burdens on farmers and their suppliers. These have combined to force severe deflation in land values and a financial crisis for many farmers.

These difficulties have prompted some critics to suggest a moratorium on agricultural research and technology development. Such a moratorium, it is suggested, would result in slower growth in agricultural production and permit domestic and international markets to absorb surplus production capacity at no real cost to consumers or producers.

Such reasoning is seriously flawed. The capacity of American agriculture to expand its foreign markets and retain its domestic markets depends on continued declines in the real costs of production. American agriculture has achieved its preeminence in the world by substituting knowledge for resources. This knowledge, embodied in more productive biological, chemical, and mechanical technologies and in the managerial skills of farm operators, has given the United States a world-class agricultural industry at a time when many other sectors of our economy are losing their preeminent position. A necessary condition for U.S. agriculture to retain its status is enhancement of both public and private sector capacity for scientific research and technology development. The costs, to both consumers and producers, of failure to maintain and enhance our efficiency in production would greatly exceed the adjustment costs resulting from abundance.

It is important for both producers and consumers that the agricultural research mission not be too narrowly defined. Research should provide farmers and policy-makers with the knowledge needed to adjust to the changes driven by national and international economic forces. Research should also be directed to the design of more efficient institutions to protect both our production capacity and the income of farm people from the costs resulting from the integration of U.S. agriculture into world markets. Society should also insist that agricultural research be concerned with the effects of agricultural technology on the health and safety of agricultural producers, with the nutrition and health of consumers, with the impact of agricultural practices on the esthetic qualities of natural and modified environments, and with the quality of life in rural communities.

New sources of productivity will be needed if U.S. agriculture is to maintain its preeminence. From 1955 to 1965, increased levels of fertilizer accounted for a yield gain of two bushels of corn per year. By the early 1980's, higher levels of fertilizer use were accounting for less than half a bushel per year yield increase. The gains in productivity growth that can be expected from traditional sources will be inadequate to meet even the relatively slow growth in demand for U.S. agricultural commodities that is now anticipated over the next several decades. During the last half century U.S. agriculture has experienced rapid gains in both output per worker and output per hectare. New sources of productivity growth consistent with changing resource endowments and the dramatic growth of scientific opportunity must be sought.—VERNON W. RUTTAN, Department of Agricultural and Applied Economics, University of Minnesota, St. Paul 55108

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SCIENCE

The Global Agricultural Support System

For the architects of the post–World War II set of global institutions, meeting world food needs and reducing poverty in rural areas were essential elements in their vision of a world community that could ensure all people of freedom from want and insecurity. Agencies such as the U.S. Agency for International Development and the World Bank have used the development of national agricultural research systems as a major instrument for aiding poor countries in meeting domestic food needs. In a number of countries, assistance from external agencies has played an important role in the development of strong national agricultural research systems. But in too many cases, domestic economic and political support has failed to materialize. A period of rapid institutional development, supported primarily by external assistance, has often been followed by the decline or even collapse of research capacity as external project support has been phased out.

In my judgment, such cycles of development and decay are a result of the traditional project approach that agencies have used in encouraging the development of national agricultural research capacity. External assistance provides an alternative to the development of internal political support, and experience has shown that such political support within a country is vital to the continued development of national research programs. National research directors have frequently found, however, that generating external support requires less political effort than developing domestic support and have chosen the easier path. The system of external support needs to be reformed in a way that will redirect political entrepreneurship toward building domestic support for agricultural research.

One innovation that might be used is for the development assistance agencies to move toward a "formula funding" or "revenue sharing" approach in which the size of donor contributions is linked to growth of domestic support for agricultural research. A second alternative would be for the group of donors to establish a support consortium that would engage in joint planning and funding of the host country's agricultural research program. This method is being used successfully in Bangladesh.

Objections to such reform proposals more often come from the outside agencies than from the recipient country. Assistance agencies often prefer to have a free hand in directing assistance resources toward the achievement of short-run political rather than long-run development objectives. And the aid constituencies in the developed countries typically have their own reform agendas which they attempt to have national aid agencies impose on recipient countries.

Why are reforms needed in the system of external support? In the developed countries agriculture has made a transition from a resource-based to a science-based industry. In 1925 corn yields in Argentina were higher than those in the United States. Fifty years later corn yields were more than twice as high in the United States as they were in Argentina. This was not a result of changes in resource endowments; it was due to the scientific and technical advances embodied in the corn seed and other inputs used in agricultural production in the countries.

By the end of this century there will be few areas in world where agricultural production can be increased by expanding the area cultivated. Countries that cannot take advantage of yield-increasing biological and chemical technology will find it increasingly difficult to maintain their export earnings from agriculture or even to meet their domestic food needs. Only a country that establishes its own research capacity in agriculture can gain access to the advances in knowledge that are available to it from the global scientific community and embody that knowledge in the technology suited to its own resource and cultural endowments.—VERNON W. RUTTAN, *Department of Agricultural and Applied Economics and Department of Economics, University of Minnosota, Minneapolis 55455*

This editorial is based on a paper presented at the Colorado State University International School for Economic Development Studies on 11 March 1983.

POLICY

U.S. history shows liberalism was not a dirty word

Conservatism is a mood rather than a philosophy

By Vernon W. Ruttan

Almost every thoughtful observer, regardless of political persuasion, agrees that the recent election campaign was characterized by excessive rhetorical aggression. Among its most disturbing aspects was the effort by President Reagan and Vice President Bush to portray liberalism (the big "L" word) as an obscenity. Almost equally disturbing were Michael Dukakis' efforts to avoid marching under liberalism's banner.

The episode is remarkable in that, except for short periods of pathological regression, liberalism has been in the mainstream throughout history. Most of the doctrines regarded by both candidates as fundamental to the American political and economic system have been the product of liberal values.

The fundamental principle that has guided the evolution of liberal values has been greater equity in access to political and economic resources.

In classical liberalism, this took the form of assuring more secure rights in real property. This involved protection against arbitrary seizure and "taxation without representation."

During the 19th century, classical liberalism stressed the continued broadening of personal liberty, including the extension of the right to vote and the abolition of slavery. But it was not until the mid-1960s that voting rights for all Americans were fully confirmed.

With large-scale industrialization and urbanization in the late 19th and early 20th century, it became obvious that security of property was an inadequate protection for those who had no property rights in their place of employment. Liberal values provided the rationale for extending bargaining rights to workers and for protecting farmers against the effects of market failure.

The New Deal reforms of the 1930s left large segments of American society untouched. The advances in liberal doctrine during the Kennedy and Johnson administrations were designed to extend the gains, achieved earlier by those who owned property or had stable employment, to the underclass of American society.

Illustration/Greg Nesbitt

This agenda remains incompletely realized. As we look toward the end of the century, there are a number of items that must, in the interest of a healthy economy and polity, occupy a high position on the liberal agenda. These include:

- The extension of health care protection to those families and individuals that have been unable to obtain access to adequate heath care through regular employment.
- An extension of access to quality education. Human capital is now a more important source of wealth than physical capital. An educational system providing unequal access to quality is a major source of inequality in access to other political and economic resources.
- An extension of our concern for political and economic equity in the domestic economy to the global economy. This implies that we again commit ourselves to a liberal international economic order and that we redirect our relations with, and assistance to, other countries with that objective.

The liberal values that have guided the evolution of America, and Western political and economic practice, remain viable and compelling. The conservative mood that has dominated American political life during the past decade is incapable of providing a guide to the future.

The advances that have been achieved by the liberalism of Jefferson, Lincoln, Wilson, Roosevelt and Kennedy are stoutly defended by most late-20th century conservatives. Within the next decade, the conservative will be tempted to add Lyndon Johnson and Jimmy Carter to their pantheon. But because conservatism is a mood rather than a philosophy, it finds itself without a road map to the future. The result is a retreat into romantic nostalgia.

I would also like to insist that there are a number of national issues for which neither liberal philosophy nor the conservative mood provide any clear guidance.

One is the issue of national defense. Both liberals and conservatives agree that an "adequate" national defense is vital. But what is adequate is an empirical question, not one of ideology or philosophy. The entire posture and responsibility of the United States for security in the region between Guam and Gibraltar has not been the subject of serious debate for more than a generation. One might have hoped that this issue would have been near the top of the agenda in the recent campaign.

The degree of inequity in access to economic resources (acceptable in a democratic society) is also an issue that conservatives can approach pragmatically. I would urge those who consider themselves conservative to ask how much disparity in access to political and economic resources can be allowed without undermining the social contract.

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ST. LOUIS POST-DISPATCH

commentary

The Problems Of Abundance

U.S. Farmers Seem To Be Doing Too Well This Thanksgiving

By Vernon W. Ruttan

Throughout history, but especially at times such as Thanksgiving, a common prayer of mankind has been to assure an abundant supply of food. This year, however, with the nation awash in grain and commodity prices depressed, many American farmers consider this abundance to be a curse.

A lot of farmers probably would give thanks at their dinner tables today if our agricultural system became less productive. Indeed, the abundance we are experiencing has prompted some critics to call for a moratorium on agricultural research and technological development.

Such a moratorium, they say, would result in slower growth in agricultural production, giving consumers the chance to "catch up" and absorb the surplus capacity that now exists.

It's an intriguing argument. Why not call off all further agricultural research until we learn to cope better with the abundant supplies we already have? Thousands of researchers would lose their jobs, but that would be a small price to pay for a more stable farm economy.

Also, government and private industry could save the large sums they now spend to develop new crop varieties, fertilizers and other farm products.

Intriguing though it may be, the argument is seriously flawed. Anyone who thinks the future of American farming lies with a reduction in efficiency ought to take a good look at what's happened to our steel, automobile and other old-line manufacturing industries in recent years. The fact is, just as in the days of the Pilgrims, American prosperity depends on improving productivity.

Certainly, many rural areas in our country are in a financial crisis. Many farmers who successfully expanded their businesses in the 1970s face mortgage foreclosures. Land prices have declined. Sales of U.S. farm products abroad are stagnant as productivity and competition from farmers in other countries increase.

Without a doubt, food surpluses are an important part of the current situation. Prior to the beginning of this century, almost all increases in food production came from expanding the area cultivated. The genius of U.S. farmers, engineers and scientists was to substitute knowledge for land, using new seeds, irrigation systems, pesticides and other inputs to boost yields. This constituted the most remarkable transition in farming since neolithic women first invented agriculture. Now this productivity appears out of control; there is too much corn, too many soybeans, too much cheese.

The blame for all this, however, does not lie with productivity itself. It lies with our failure to reform our agricultural policies to adapt to this abundance.

For instance, we now have a federal program that pays farmers billions of dollars to limit the amount of land under cultivation. Yet, in an age when agriculture has shifted from a land-based system to one dependent on scientific and industrial inputs, reducing the area planted cannot effectively restrain production. It does not control the impact of better crop varieties, production methods and other industrial inputs. As a result, the program is excessively expensive while failing to reduce surpluses.

Agriculture must learn to exploit new technology effectively, just as manufacturers are learning to deal with robots and local banks are installing automated teller machines. The alternative — turning away from new technology because we fear increased productivity — leads inexorably to decline, as we have seen in other American industries. Just as General Motors competes with Toyota and Boeing competes with the European Airbus consortium, so is international competition increasing in agriculture. One need only walk down the aisle of the local supermarket to find Mexican tomatoes, Chilean grapes and Italian noodles.

U.S. farmers cannot expect to have lower labor prices than most foreign competitors, so their best hope is to outsmart the competition with better technology. This requires a strong public and private sector capacity for scientific research and technological development to assure that our farmers have the best seeds, fertilizers, pesticides and other inputs. Maintaining this technological base has become essential if we are to reverse recent declines in U.S. agricultural exports.

We must retain a historical perspective and not allow ourselves to be overwhelmed by cyclical changes. Over this century, increased productivity has permitted farm families to achieve a much higher standard of living and enabled U.S. consumers to enjoy an abundance of turkeys, sweet potatoes and other foods at low prices. The challenge before us at this Thanksgiving is to deal with abundance more effectively and share it with those who are hungry, not to turn away from it because our table appears full.

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How to *Really* Reform Farm Policy

A prominent economist says agricultural policy should be more concerned with disadvantaged people than with property values or commodity prices.

BY VERNON W. RUTTAN

ONCE AGAIN Congress has passed and the president has signed into law a new farm bill that fails to resolve the contradictions in U.S. farm policy. These contradictions arise out of a set of market interventions and tax subsidies that have become more baroque each time new farm legislation is passed.

The mislabeled Food Security Act of 1985 represents a calculated attempt to use higher program payments to farmers in order to purchase lower commodity prices and, therefore, create greater competitiveness in world markets. The latest upward revision of program cost estimates run in the $25 billion to $30 billion-per-year range — approximately double the annual level of expenditures under the 1981 Act. The 1981 Act — which cost several times as much to administer as any previous farm program — failed to stem the sharpest decline in farm income and the most severe farm financial crisis since the Great Depression of the 1930s.

John Block, Illinois farmer and sometime land speculator, will not administer the new legislation; he resigned as Secretary of Agriculture to accept employment in the Washington "influence industry." His departure was not mourned by those who initially believed that having a farmer in the Secretary's office would give farmers greater influence.

Block's commitment to the Reagan administration's ideology — a market-oriented agriculture — trapped that administration into the most expensive farm program in history. Instead of making the acreage cuts in 1982 that Department of Agriculture analysts recommended, Block procrastinated. When surpluses mounted, the administration panicked, instituting a PIK (payment-in-kind) program that tripled program costs and caused a depression in the farm supply industries.

Block's successor, Richard Lyng, is expected to run a tight ship. But he can hardly be expected to generate new farm policy ideas in the constipated fiscal and policy environment prevailing in the second Reagan administration.

Failure to reform

AMONG ALL segments of the agricultural community, there has been substantial concern that fundamental reforms are long overdue. During 1984 and 1985, there was a flurry of conferences, workshops, and consultations designed to lay out the intellectual foundations for the 1985 legislation. From these discussions there emerged a consensus: The methods that had proven relatively successful in managing agricultural commodity programs between the mid-1960s and the late 1970s were no longer effective. Those methods placed the United States in the position of a residual supplier in world agricultural commodity markets. Furthermore, the price floors they attempted to provide for U.S. farmers acted as price supports for competing farmers in other countries. While imposing production constraints on our own farmers, the PIK program, in effect, subsidized production in the rest of the world.

But 1985 was not an appropriate environment in which to consider reform. An overvalued dollar and high interest rates had combined to deepen a farm financial crisis that was squeezing the inflation-induced water out of land prices. The financial crisis in American agriculture did not provide a favorable atmosphere for the reform of agricultural policy.

Program distortions

DESPITE THE jumble of target prices, loan rates, and deficiency payments, the basic principles guiding the more specific program provisions of the 1985 farm bill are relatively simple. The major field crop programs — those for wheat, corn, cotton, and rice — operate by "renting land" from farmers.

The "rent" that induces a farmer to idle enough land to participate in the program is referred to as a "deficiency payment." It is calculated as the difference between a "target price" and the "loan rate" (or market price, if it exceeds the loan rate) multiplied by the normal yield on the eligible portion of the farmer's historical "base" acreage. [See illustration, page XX.] The loan rate is the price at which the government stands ready to acquire and store farm commodities. The 1986 program's high cost results from the large number of participating farmers attracted by a relatively low loan rate and a high target price.

The dairy program operates through a system of legalized trade restraints and the purchase of surplus production. To enhance the price paid to local producers, the movement of fluid milk among

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"market order" areas is restricted. In addition, producers of milk used in processed dairy products are protected by a program in which the government purchases sufficient amounts of manufactured dairy products, primarily butter and cheese, to hold the price of milk for manufacturing use at or above price support levels.

As a result of a large buildup of surplus dairy products, the government made an effort in 1984, and is again making an effort in 1986, to reduce milk production. The 1986 program attempts to cut back milk production by paying farmers on a bid basis to dispose of their entire dairy herds. Farmers whose bids are accepted must agree to stay out of the dairy business for five years.

There are also state-operated programs for a number of minor commodities, primarily tree crops such as California oranges. Such programs attempt to maintain or enhance commodity prices by restricting either the amount produced or marketed.

There is no way that a program attempting to limit supply or enhance prices by renting land from farmers, or through direct purchase of farm commodities, can avoid directing its benefits to the largest farmers. Most of the land has to be obtained from the 15 percent to 20 percent of all farmers accounting for 60 percent to 80 percent of production. Attempts to significantly limit the payment any farmer can receive are ineffective. An equitable payment ceiling would limit program participation by the farmers whose production must be curtailed to make a success of the effort to control production. The $50,000 per farm payment limitation authorized in the 1985 Act "leaks at the top." Furthermore, it will be escalated upward if loan levels are reduced. The program, as it has come to operate, provides large-scale farmers with subsidies that can be used to acquire the assets of smaller farmers. It is inherently biased against the family farm.

The cards have also been stacked against the family-size farm by a set of tax shelters and subsidies. Tax shelters have encouraged investment in orchards, vineyards, and in livestock breeding herds, by provisions converting ordinary income into capital gains. Payments made to farmers under programs justified on the basis of soil conservation have subsidized practices that directly stimulate production and that have drawn fragile lands into production. When an attempt is made to retire fragile lands from production, as in the Conservation Reserve Program of the 1985 Act, the government must bid against *itself* for the land. The farmer must ask himself whether he is better off collecting a deficiency payment by idling acreage under the commodity price-support program or by idling the land on a long-term basis under the Conservation Reserve Program.

The program [the 1985 Act] provides large-scale farmers with subsidies that can be used to acquire the assets of smaller farmers. It is inherently biased against the family farm.

If the agricultural economy were still characterized by only moderate differences in farm size, the distributional effects of a program in which benefits are linked to production levels might not be unduly regressive. But as the structure of the agricultural industry has become increasingly bimodal, with the bulk of payments going to a smaller and smaller percentage of larger farmers, the distributional implications have become increasingly regressive. Furthermore, since the tax shelters and subsidies are often of greater value to high-bracket urban investors than to producing farmers, they have the effect of encouraging the growth of "tax-loss" farming.

Guidelines for reform

SUPPLY MANAGEMENT programs still seem to represent a viable component of presidential and congressional coalition politics. But it is increasingly difficult to discover either an ethical or a political basis for programs involving larger and larger transfers to upper-income farm operators at a time when income transfers to the poor are being re-examined and curtailed. The achievement of supply management through renting land from farmers or the purchase and disposal of surpluses should no longer represent a serious priority on a policy reform agenda.

Two approaches might guide the design of agricultural policy reform. One is to proceed in a pragmatic way to make incremental changes in existing programs that will be needed to get farm legislation through Congress. A second alternative is to attempt to guide the incremental changes that must be made in a direction consistent with a coherent set of political and economic principles.

I anticipate that agricultural policy changes will continue to be made incrementally. Yet a clear road map indicating the direction of policy reform could be a useful guide for the process of incremental change.

I've attempted to set forth some policy reform guidelines that are consistent with liberal political and economic principles. But there is an important distinction between 19th century liberalism and 20th century liberalism. The earlier liberal agenda focused on issues of personal freedom and the protection of property rights, while the new liberalism focuses on a more equitable distribution of economic and political resources. The following guidelines for reform derive their rationale from a perspective that agricultural policy should be responsive to the needs of disadvantaged people rather than to the protection of property or commodity values:

- *Income transfers should be designated to protect purchasing power rather than property values.* Loss of property values in land should be of no greater public concern than loss of property values in the stock market. It should become a public concern only if such losses become a threat to the basic subsistence needs of farm families.
- *Income transfers should be equitable across sectors.* Thus, the transfers protecting farm incomes against instability in product prices should be consistent with the income transfers protecting industrial workers from instability in employment.
- *There should be evenhandedness in the taxation of income generated by labor and income generated by ownership of property.* This means that income tax rates should be the same on earned income and on capital gains (corrected for inflation).
- *Transfers that reduce the cost of capital accumulation, enhance property values, or subsidize input costs should be eliminated.* Most of these transfer programs are doubly regressive. The initial payments are biased toward those with above-average incomes, and they increase the cost of the regressive commodity price support programs.
- *Agricultural commodity markets that are governed by marketing orders should be deregulated.* These market regulations tend to tax consumers in order to generate institutional rents for established producers of the protected commodities.
- *Import restrictions in the form of quotas or differential tariffs on raw and processed commodities should be eliminated.* In the domestic economy, the effects of import restrictions are largely regressive. The gains tend to flow to high-income producers and the costs are imposed on lower-income consumers. Commodities should be as free to move across state or national borders as credit is.

• *More effective employment and income protection programs should be designated for the benefit of farm workers.* Nearly one-third of the labor in American agriculture is now accounted for by hired workers. A major thrust of the labor legislation of the last half-century has been to establish more effective property rights with respect to the conditions and terms of employment through bargaining rights, unemployment compensation, and other measures. Farm workers have shared unequally in this development.

Having stated these principles, we are left with the question of how to move away from a set of regressive commodity programs toward a program that is more equitable — both within agriculture and relative to the workers in other sectors of the economy.

Implementing reform

THE FIRST step would be to redesign the major commodity programs to eliminate the price support loan rates. The loan rate is the "floor price" at which the government is obligated to accept the commodities that are in surplus (those that cannot be sold in the market at that price). Elimination of the loan rates would permit dismantling of the obsolete system of acreage allotments and "bases" on which the loans are based. It would permit commodities to be produced in those areas where costs are lowest. It would permit agricultural commodities to move into international trade at market prices. The United States would no longer be forced to occupy the role of a residual supplier in world markets or to hold a price umbrella over producers in other countries.

Payments to farmers should be based on the difference between the market price and a "target price" — a price designated to cover production costs in normal years on an efficient family farm. The payments should, however, be subject to a payment limitation that reflects a much greater sense of equity among farm and nonfarm recipients of transfer payments than the present $50,000-per-farm limitation. The elimination of the loan levels would permit a refocusing of the debate on an equitable target price level and payment limitation.

There are also more radical options that would be consistent with the equity guidelines suggested above. One might be a "buy-out" provision similar to those employed by many business firms to encourage early retirement. Program costs under the 1985 Act net out to an average annual cost of about $30,000 per farm. Large numbers of older and marginal farmers would find it attractive to leave farming at an income well below the present average-per-farm program cost level. Such a program would remove the protective shield of benefits to small farmers that is often used to justify the present price support system.

The programs proposed here could not be expected to fully resolve the problem of efficient markets. Agricultural markets are inherently unstable. A combination of inelastic short-run demand and supply relationships will continue to impose great instability on agricultural prices and on the incomes of the farm people who produce agricultural commodities. The producers of agricultural commodities can be expected to continue to exert their considerable political resources to maintain programs that dampen the fluctuations in agricultural prices.

Much of the price instability faced by agriculture is a product of inefficient or perverse macroeconomic policy. The appropriate focus of policy reform is in the areas of monetary and fiscal policy. Such reform is important, not only to farmers, but to every other productive sector of the American economy. Its achievement would make it easier to limit interventions in agricultural commodity markets to the maintenance of the reserve stocks necessary to protect both producers and consumers from the most extreme price fluctuations.

DEVELOPMENT

Launching a U.S. effort to rescue the world's poor

By Vernon W. Ruttan

This is the time of year when Americans pause to take stock of their obligations to people left behind by economic progress, at home and abroad. Opinion polls have repeatedly shown that foreign aid is unpopular with the American electorate. Yet these same polls have indicated great sympathy for the poorest people in the poorest countries, particularly victims of disaster — whether due to the caprice of nature or the cruelty of man.

One reflection of this concern was the "Global Poverty Reduction Act" introduced in Congress last summer. The legislation would direct the president to establish a plan whereby U.S. foreign aid would contribute measurably to eradicating the worst aspects of poverty by the year 2000.

The specific targets included improved female literacy and reduced infant mortality. The act was co-sponsored by Minnesota Sen. Rudy Boschwitz and endorsed in a June 19 Star Tribune editorial. It did not pass.

The Global Poverty Reduction Act was similar in spirit to the "basic human needs" mandate of the 1973 Foreign Assistance Act crafted by Minnesota Rep. Donald Fraser.

The proposed act also shared with earlier foreign-aid legislation one glaring deficiency: an almost cynical disregard for the disparity between the idealistic goals enunciated in the legislation and the limited means dedicated to the achievement of those goals.

In the mid-1970s, after passing the basic human-needs mandate, Congress and the Nixon administration immediately began to shift resources from the part of the aid budget that supports development in the poorest countries to the security-oriented part of the budget that supports assistance to countries that are politically important to the United States, such as Egypt, Israel, Turkey and Pakistan.

During the Bush administration, it will be difficult to maintain even the current low levels of development assistance. The foreign-aid budget, like all federal programs, will be subject to the stringency imposed by the large federal deficit.

Additional resources for poverty-oriented aid will almost certainly have to come from reallocations within the aid budget. Since well over half of total U.S. aid is currently channeled to the Middle East, it would take an easing of tension in that region to permit a modest reallocation of aid resources.

With limited resources for development aid, the Bush administration will need to examine carefully what has and has not worked in the past.

■ Development assistance has been most successful in reducing poverty when it has been directed to activities that generate rapid economic growth. The poor in rapidly growing countries such as South Korea and Taiwan have benefited from development, while those in countries such as Ghana and Tanzania have become even poorer. Countries which have not been able to achieve rapid economic growth have not been able to sustain poverty-reducing programs when foreign aid was no longer available.

■ There is no way a developing country can achieve the required rates of growth in agricultural and industrial production without large public and private investments in transportation, communication, energy, and land and water-resource development.

■ Investment in people has a high payoff. In the absence of such investment, particularly in health and education, resources spent on building infrastructure generate low returns and little growth. The lower yields of rice and wheat in the Pakistan Punjab than in the Indian Punjab — areas with similar resources and technology — is a clear indication of the effect of differences in literacy on the productivity of farm people. Success stories include the establishment of modern institutions for higher education and for agricultural research in a number of developing countries. These institutions provide farmers with the knowledge and technology needed to generate rapid food-production gains.

■ A larger economic environment creates a favorable environment for development. The impact of even very large amounts of foreign assistance can be dissipated by inappropriate domestic policies. The overvaluation of national currency discourages the exports needed to sustain growth. Excessive protectionism results in the growth of uncompetitive enterprises that become a burden on growth. Forcing agricultural prices below market levels to provide cheap food to urban consumers wastes investment in rural infrastructure.

What are the implications of these lessons for the targets proposed in the Global Poverty Reduction Act? The objectives of increasing the literacy of rural women and reducing infant mortality should represent high-payoff components of any people-oriented development-assistance strategy.

There has often been a bias against the poor, and especially against the rural poor, in past assistance for health and education. There are too many countries where rural schools do not extend beyond the fourth or sixth grade. There are too many countries where sophisticated hospital facilities are available to the wealthy in urban areas but where clean water and basic health care are not available in the villages and rural areas.

But any presumption that the U.S. aid program could achieve measurable progress in accomplishing the objectives of the Poverty Reduction Act by the turn of the century is an exercise in self-indulgence. Unless large new resources can be found to support the effort, this plan would be no more effective than the "basic human needs" legislation of the 1970s.

The foreign-aid program has clearly lost its sense of purpose. It is not too much to hope that the Bush administration and Congress will build on the traditional American enthusiasm for fighting poverty by designing an assistance program that would place less emphasis on strategic concerns and great emphasis on people.

But the United States should approach the task with realism. It should avoid the disparity between means and ends that has doomed past aid programs. Unrealistic illusions about what can be accomplished can only lead to further disillusionment.

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Development and modes of production in Marxian economics: A critical evaluation. By ALAN RICHARDS. Fundamentals of Pure and Applied Economics, vol. 12. Chur, Switzerland; London, Paris and New York: Harwood Academic, 1986. Pp. viii, 151. $36.00. ISBN 3-7186-0332-2. *JEL 87-1027*

In this book, Alan Richards presents a sympathetic but critical review of the Marxist approach to economic development. He identifies the Marxist approach with four characteristics: 1) a systemic view of society in which technology, property relations, and work relations are endogenous; 2) a view of change based on a) social conflict and b) contradictions; 3) a view in which "class," an intermediate category between individual and society, has a pride of place and is defined primarily by differential access to land and produced means of production; and finally, 4) a view that classes with limited access to such assets are "exploited" (p. 23).

The book contains an Introduction, three substantive chapters on (a) Agrarian Political Economy; (b) The National Level: Class and State; and (c) International Dimensions; and a Conclusion and Summary. The book is particularly valuable for interpreting a number of controversies between Marxian and non-Marxian students of development and among different Marxian schools in a language that is accessible to non-Marxians. The issues that are discussed include:

- The relationship between the forces of production (technology) and the relations of production (institutions) in Marxian thought and in the process of economic development.
- The process of class formation in the transition from peasant to capitalistic agriculture.
- The distinction between the "labor surplus" and the "property rights" approach to the definition of exploitation.
- The interrelationship between class formation and the autonomy of the state in policy formulation.
- The distinctions among the several neo-Marxist approaches to international relations: the dependency, dependent development, world systems and internationalization of capital schools.

In the final section of the book, the author suggests ways in which more open dialogue between the Marxian and non-Marxian students of economic development might enrich the work of both traditions. There is a need for better microfoundations in the Marxian tradition—better methods of achieving a more rigorous dialogue between theory and data. Richards insists that the power of non-Marxist analyses would be enhanced by more explicit recognition of the role of conflict and exploitation. He is particularly critical of the induced institutional innovation school, with which I have been associated, for its reliance on "disequilibrium" to the exclusion of "conflict" as a source of institutional change.

Alan Richards should be congratulated for an excellent exposition of the Marxian approach to economic development. The book belongs on the shelf of all development economists and on the reading lists of courses in development thought.

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Reynolds, Lloyd G. *Economic Growth of the Third World*. New Haven CT: Yale University Press, xii + 469 pp., $35.00.

In this book Lloyd Reynolds attempts to draw together in one volume the results of much of the post-World War II research on the economic growth in Latin America, Asia, and Africa. The book is a testimony to Reynolds' capacity to synthesize the results of a body of literature that has been growing at something approaching an exponential rate. It is also a tribute to the diligence with which economic historians and development economists have pursued the often elusive data from a large number of developing countries to construct a coherent picture of economic growth. The book simply could not have been written before 1980!

The book consists of four major sections. In the first few chapters Reynolds presents an analytical framework and a general overview of growth patterns. The analytical framework consists primarily of a taxonomy in which he segments the growth history of each country into three phases: (*a*) a period of extensive growth in which population and output are growing at roughly the same rate, with no measurable growth in per capita income; (*b*) a period of perhaps a decade when the country makes a transition to sustained growth in per capita income which he labels the turning point; (*c*) a period of intensive growth in which output exceeds the rate of growth in population, thus permitting a sustained rise in per capita income. This taxonomy is supplemented by the Clark-Fisher structural transformation framework extended to include the role of the public and trade sectors as well as the standard primary, secondary and tertiary sectors.

Reynolds argues that the turning point used in his analysis is superior to either the Lewis-Ranis-Fei "commercialization" point, which marks the end of the pool of surplus labor in agriculture; or the Rostow "takeoff," which identifies the rapid development of industrial production as the critical turning point. In the Reynolds' schema "the turning point is typically characterized by an acceleration of agricultural (or occasionally mineral) output and a rising foreign trade ratio. Rising income from exports does broaden the domestic market for manufactures, but the initial supply response comes mainly from handicraft workshops and small-scale industries. There is usually a lag of several decades before factory industry becomes prominent, though this lag has been shorter since 1950 than it was in earlier times" (p. 10). I found Reynolds' review of the period of extensive growth, often characterized by rapid increase in both agricultural and industrial production as well as the strengthening of physical and institutional infrastructure, very useful in attempting to understand subsequent growth history.

In the second section Reynolds reviews the development history of twenty-five countries that made the transition to intensive growth between 1850 and 1950. The third section is devoted to eight countries that appear to have achieved intensive growth in the 1950–80 period and seven "nonstarters" that have not yet reached the turning point. In a fourth section Reynolds attempts to provide a cross-section perspective on comparative growth performance of the forty-one countries and to draw some lessons, or at least some suggestions, regarding the role of government in the development process.

There is no way that I can attempt to summarize the results of the Reynolds analysis. However, there are several points that are worth emphasizing.

On the historical side Reynolds identifies two periods that were exceptionally favorable for economic growth of the countries in his sample. Twenty-three of the countries reached the turning point and initiated intensive growth during 1870–1914. Only three countries "took off" during 1914–

45. The second "golden age" was 1950–73. During this period of unprecedented growth in world output and trade, eight additional countries reached the turning point. According to Reynolds, "the most significant development since 1945 is *not* a widening of the gap between third-world and OECD countries. Some widening seems to have occurred, but more significant is the sharp pulling apart of growth rates *within* the third world itself. As of the 1980's we find a top group of countries that will certainly continue to grow and (probably) to overtake the OECD countries. At the bottom is a group of stagnating or declining economies that are falling farther and farther behind the world average" (p. 392).

The term "third world" has lost whatever significance it once had! And it also seems apparent that something more than a resumption of world economic growth will be necessary to draw the nonstarters, including the many who are not included in his sample, into the intensive growth process.

What else will it take? Reynolds has attempted to deal with this question in his last chapter. His answer is "development of an effective framework of economic institutions" (p. 420). He provides us with some guides as to what such a framework would contain: (*a*) more effective institutions governing land ownership; (*b*) a legal and judicial system to protect property and ensure enforceability of contract; (*c*) the capacity to plan, budget, and implement public sector economic activities. But these admonitions remain an empty box since we know little about the processes of either evolutionary or planned institutional innovation or design.

One aspect of Reynolds' analysis that I found somewhat surprising was his repeated reference to growth in the public sector share of GNP, the ability of the public sector to command a larger share of national resources, as favorable to the development process. This assumption would seem to require a more adequate defense than Reynolds has provided. The last decade has witnessed, in a number of developing countries, a shift toward the privatization of formerly public sector activities, generally with favorable impact on growth rates.

An issue which may be of particular interest to readers of this *Journal* is what kind of performance is it reasonable to expect from the agricultural sector as a country moves through the turning point into the period of intensive growth? There are a number of points where Reynolds comments on the poor or modest performance of agriculture in countries where agricultural output was expanding in the range of 3% per year (pp. 111, 185, 351). At other points he considers growth rates in this same range as reflecting substantial accomplishment (pp. 283–85, 306–314). One way to put these numbers in perspective is to consider the growth rates in Japan and the United States, two countries which have been regarded as relatively successful in agricultural development:

Annual Compound Rates of Growth in Output, Input, and Productivity in U.S. and Japan Agriculture: 1880–1980

	1880 to 1900	1900 to 1920	1920 to 1940	1940 to 1960	1960 to 1980	1880 to 1980
United States						
Output	2.2	0.8	1.3	1.9	1.9	1.6
Total inputs	1.6	1.4	0.2	0.1	0.3	0.7
Total productivity	0.6	−0.7	1.1	1.9	1.6	0.9
Japan						
Output	1.6	2.0	0.7	1.8	1.9	1.6
Total inputs	0.4	0.5	0.3	1.6	1.0	0.7
Total productivity	1.2	1.5	0.4	0.2	0.9	0.9

(Source: Hayami, Y., and V. W. Ruttan, p. 167.)

The data on Japan and the United States suggest that even during the periods of most rapid growth, output rarely increased by more than 2% per year. How do these rates compare with the agricultural performance of the forty-one countries in the Reynolds sample? Five high performance countries have achieved annual growth rates of agricultural output of 4% or above for the entire period:

Annual Growth Rates of Agricultural Production in Five Countries: 1952/54–1979/81

	1952/54–1959/61	1959/61–1969/71	1969/71–1979/81	1952/54–1979/81
South Korea	5.4	3.2	4.2	4.4
Thailand	4.5	5.1	5.1	4.8
Malaysia	3.0	5.6	4.8	4.4
Mexico	5.0	4.5	3.5	4.1
Venezuela	4.5	5.3	3.8	4.4

(Source: Reynolds 1985, p. 406.)

Only one of these five, Thailand, achieved a growth rate above 4% in all three periods. In addition to these five countries, two other countries (Brazil and Sudan) achieved growth rates of above 4% for two of the three periods, while five additional countries (Iraq, Colombia, Philippines, Ivory Coast, Morocco) achieved growth rates of above 4% for one of the periods. How can these "high performance" countries be characterized? Except for Korea all of the countries that have achieved high performace for two or three periods are characterized by an extensive pattern of agricultural development based on rapid expansion of area cultivated. Thailand and Malaysia have, during the last period, combined extensive development with intensive development based on the high-yielding crop varieties and heavy use of industrial inputs. Korea has been able to sustain rapid growth over three periods by land development (irrigation, drainage, terracing), development and diffusion of modern crop varieties, subsidized pricing of industrial inputs, and pricing of output at well above world market prices.

I am not ready to assume that achievement of a rate of growth in agricultural output in the 4% range over a period of several decades is a reasonable possibility for most poor countries. Rates in the 4% range for as long as a decade, when achieved, will typically reflect (*a*) rapid exploitation of the land (or land and water) frontier combined with modest yield increases (as in Sudan in 1952/54 to 1969/71); (*b*) modest increases in land area combined with rapid increases in yield-increasing technology; (*c*) the release of institutional constraints that had forced a severe disequilibrium between performance and potential (as in China since 1978). As most countries move into the intensive phase of agricultural development, it will take a combination of substantial investment in agricultural research and extension, rapid growth in the use of industrial inputs, and efficient factor and product market performance to sustain agricultural growth in the 2%–3% per year range let alone in the 3%–4% range.

In his preface Reynolds noted that country (and presumably subject matter) specialists would doubtless find fault with the details of his exposition. He devotes adequate space to agricultural growth. His command of the numbers is firm, but his attempts at interpretation do not run very deep. Agricultural economists will find that his interpretations might have been a bit more secure if he had consulted the agricultural development literature more thoroughly.

Who should read the book? Certainly every World Bank or AID staff member or consultant off to a new assignment should find it useful to read the relevant country studies as s/he jets between Washington and a new assignment. It will be useful as a reference, but not as a text, in courses in economic development. It is certainly the best single source of what is now emerging as the conventional wisdom of the 1980s on development thought and policy.

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Julian Simon. **The Ultimate Resource.** Princeton, N.J.: Princeton University Press, 1981. Pp. x+414.

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Julian Simon is a man with a message: People are the ultimate resource and a growing population is preferable to a stationary or declining population!

While attempting to convert us to his new faith, Simon also attempts to slay a few dragons. Among the mythological creatures humiliated by his pen:

International bureaucrats. He notes that the repeated assertion by the secretary general of the United Nations that "more than 100,000 West Africans perished of hunger" in the Sahel between 1968 and 1973 had no empirical foundation. The official estimate widely exaggerated the best staff estimates, which were in turn no more than educated guesses.

Food activists. He argues, and correctly, that real progress is being made in overcoming hunger. Even in poor countries famines are less frequent and people are typically better fed than at any time in ancient history. Institutional constraints on resource development and use, and on the generation and diffusion of technology, rather than fixed resource supplies, limit increases in food production.

Resource fundamentalists. Simon insists that in any meaningful sense raw materials have become less rather than more scarce. The real costs of natural resource products and services have declined. The second law of thermodynamics provides no meaningful guides to resource policy.

However, Simon's obvious accomplishments are more than overshadowed by the blindness with which he pursues the mission of attempting to convince his readers of the benefits of rapid population growth.

Simon's assertions about the benefits of population growth rest very heavily on simulations based on a population and economic growth model reported in what he refers to as his "scientific" work.[1]

> Streams of per-worker income were compared for a wide variety of population growth structures, including both one-time increases in population size and different rates of population growth . . . and . . . under a variety of economic assumptions about savings rates and about the ways that additional people and various income levels affect changes in productivity. The most important result is that under every set of conditions, demographic structures with more rapid population growth came to have higher per-worker income than less rapid population growth structures, within 30 to 80 years after the birth of additional child. Most often this happens after about 35 years—that is about 15 years after the additional person enters the labor force. [P. 266]

Simon argues, in effect, that poor societies should ignore the short-run costs of population growth in order to enjoy the longer-run benefits.

The sources of the long-run benefits are, in Simon's analysis, generated by economies of scale in the use of physical and institutional infrastructure and in the contribution of human capital—"the most important economic effect of population size and growth is the contribution of additional people to our stock of useful knowledge" (p. 196).

But Simon does not attempt to respond to the question how a larger population can be expected to contribute to the advancement of knowledge and productivity in societies that are unable or unwilling to provide their existing members with the health and education necessary to enable them to make more than a marginal contribution to their own or to national well-being. To lament the Edisons and Einsteins who will never be born because of effective constraints on population growth is almost obscene when the potential contributions of those who are already born go unrealized because of high infant mortality rates, low school enrollment, and unrewarding employment. In many poor countries, providing a rapidly growing population with basic needs and amenities competes with improving the quality of food, clothing, housing, education, and health for a more slowly growing population.

My own review of the limits-to-growth literature leads me to a perspective that is consistent in many respects with Simon's. "The advance of science and technology has enabled modern society to achieve a more productive and better balanced relationship to the natural world than in ancient civilizations or in the earlier stages of western industrial civilization. The rhetoric about 'finite earth' is clearly misleading. The impact of science and technology has been to expand the size of 'spaceship earth' along those dimensions that are most significant for human existence."[2]

But I cannot conclude with Simon that this fact implies the desirability even of a moderately rapid rate of population growth—for either rich or poor countries. I have no trouble concluding with Simon that the United States or the world may be better off than at present, both materially and culturally, when sometime in the next century world population reaches a level of 10 billion. But I do argue that prudence suggests that the world approach higher population levels slowly.

If Simon is correct, the only penalty a poor society incurs by a low rate of population growth is the loss of a few hundredths of a percentage point in its annual economic growth rate—a loss that can be made up in the future. But if Simon is wrong, the penalty is larger—the country ends up with more and poorer people and with fewer options for the future. I can think of few poor countries that would not be better off with a population growth rate of below 1.0% per year than with a population growth rate of above 2.0% per year.

The Ultimate Resource is marred by the same qualities of simplistic analysis and exaggerated rhetoric that disturb Simon in the work he criticizes. The book lends itself to being used and misused—but I do not recommend either!

Notes

1. Julian L. Simon, *The Economics of Population Growth* (Princeton: Princeton University Press, 1977).

2. Vernon W. Ruttan, "Technology and the Environment," *American Journal of Agricultural Economics* 53 (December 1971): 707–17.

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STRUCTURE

Minnesota Journal

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More state crop production to come from larger farms

by Vernon W. Ruttan

First of two articles.

As we attempt to think about the future for Minnesota agriculture, it is useful to consider the fundamental forces that have shaped its change. One has been the rising value of labor in the American economy.

Since Minnesota was first settled, competition between the farm and nonfarm sectors for labor has induced advances in mechanical technology that have enabled each farm worker to cultivate more acres.

A second has been rising land values. The closing of the land frontier induced advances in biological technologies that have enabled farmers to produce more from each acre.

In spite of the economic and technical changes which have shaped Minnesota (and American) agriculture, most Minnesota farms remain family scale. And, as we look forward to the end of the century most Minnesota farms will continue to be family scale.

There will, however, be changes in farm structure. A larger share of farm output will be concentrated on farms of above 500 acres and on farms with sales of more than $100,000.

What does this mean in terms of actual farm numbers? In 1982 the U. S. Census of Agriculture identified 94,380 farms in Minnesota. The Census used a definition in which any unit that had sales of at least $1,000 was counted as a farm. In fact, a large number of these "statistical" farms were not seriously engaged in agricultural production.

Continued on Page 4

Farm

Continued from Page 1

Two measures of farm size are sales and acreage. For sales, the 1982 Census showed:

Sales Above	Number of Farms
$20,000	55,935
$40,000	41,000
$100,000	17,047
$250,000	3,391

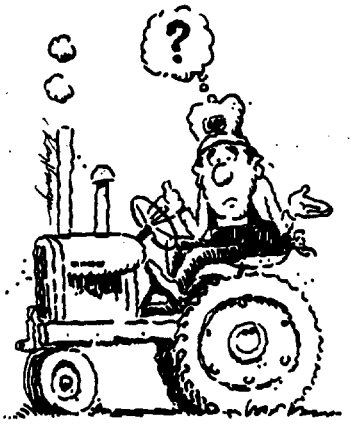
For acreage, the Census showed:

Acres Above	Number of Farms
180	50,044
260	36,269
500	14,216
1,000	3,614

If the Census used a definition that excluded those operations that were not seriously engaged in agriculture — farms whose operators were primarily engaged in another occupation or those on which farming is conducted as a part-time, recreational or retirement activity — it would have counted substantially fewer than 50,000 farms.

In 1982, approximately 30 percent of Minnesota farm operators reported working off their farms more than 150 days. And the level of farming activity on many of these farms was too small to provide net incomes above the poverty level.

The 40,000 to 50,000 farms that produced 75 to 80 percent of Minnesota farm output in 1892 also provided employment for



somewhat in excess of 20,000 reasonably full-time hired farm workers. And they provided part-time and seasonal employment for upwards of 100,000 additional workers.

If the U. S. economy should return to reasonably full employment there will be additional loss of farm operators and hired workers to the nonfarm sector. The result will be an even more distinct bimodal structure in Minnesota agriculture. The difference between fully commercial and other farms will become even more marked than at present.

It is unlikely, however, that there will be significant change in the commodity composition of Minnesota agricultural production. Crop production will continue to be dominated by corn, soybeans and wheat. These crops have accounted for roughly two-thirds of Minnesota crop acreage in recent years. They could account for a slightly higher percentage by the turn of the century. Total acreage of cropland can be expected to decline slightly as some of the land brought into production during the 1970s reverts to nonagricultural use. (Space does not permit consideration of two other mainstays of Minnesota agriculture, dairying and livestock production.)

The possibilities of expanding the production of high-value-per-acre special crops such as fruits, vegetables and potatoes in Minnesota have received a good deal of attention. In recent years, fewer than 400,000 of Minnesota's 22 million acres of cropland were devoted to these crops.

By the turn of the century, it is possible that specialty crop acreage could rise above 500,000 acres. But it would be unrealistic to think about an increase that would bring specialty crops production into the 1-million-acre range.

These crops simply do not require much acreage. We have an abundance of land in Minnesota — in a sense you could say we are stuck with it — and our farmers will produce on it, no matter what the price of the land or the price of the commodities they can grow.

This picture for the turn of the century is based on the continuation of recent trends in the national economy and in the agricultural sector. But the purpose of such scenarios is not to forecast the future. The purpose is to see if alternative futures should be explored. What are some of the alternatives? We'll look at those in the next issue.

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SCALE, SIZE, TECHNOLOGY AND STRUCTURE: A PERSONAL PERSPECTIVE*

Vernon W. Ruttan**

In these notes, I first discuss some recent perspectives on the relationship between technical change and economies of scale. I then discuss the issues of scale economies from the perspective of the Hayami-Ruttan work on induced innovation. In the third section, I raise the question of why farms are so small. I then turn to the issue of potential technological constraints on labor and land productivity. In a final section, I raise several questions about research on farm structure.

I

Discussions of technical change, economies of scale, and farm size are burdened with a rhetoric that makes effective communication exceedingly difficult. In much popular and even professional discussion, it is taken as self-evident that the historical association between advances in mechanical technology, growth in labor productivity, and increases in farm size can be taken as evidence of scale economies (OTA, 1986). In this view, technical change has led to size or scale economies, a reduction in farm numbers, and the exit of labor from agriculture. An implication that is sometimes drawn is that the appropriate policy is to slow the role of technical change.

But changes in farm size may also be due, at least in part, to changes in relative factor prices -- to the long-run increase in the price of labor relative to other factors. There is a body of literature that suggests that almost all increases in farm size can be accounted for by factor substitution along a neo-classical production function. According to Peterson and Kislev, "the ratio of the opportunity cost of farm labor to the price of machinery services determines the size of the farm operation by influencing the machinery-labor ratio... We explain virtually all of the growth in the machine-labor ratio and in farm size over the 1930-70 period by changes in relative factor prices without reference to 'technological change' or 'economies of scale'" (Kislev and Peterson, 1981; Kislev and Peterson, 1982). If this view is correct, the fact that real wages in manufacturing have now remained stable for approximately a decade and a half would account, at least in part, for recent farm size stabilization.

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There is also an emerging body of literature that has attempted to formalize and test the insights of Allyn Young (1928) which attribute much of firm growth to external scale economies (Romer, 1986; Romer, 1987). In Romer's work, it is the emergence of an increasingly complex or differentiated set of specialized inputs and the spillover of knowledge between firms that is the source of externality. My guess is that the Romer effects would become increasingly important in the agricultural sector as the level of purchased inputs, capital, and operating expenses rises relative to inputs supplied by the individual farm. Evidence that very large farms acquire inputs at lower cost or receive higher prices for their product than most farms is consistent with this hypothesis (Miller, 1979).

II

Work I have conducted with Yujiro Hayami, Hans Binswanger, and others treats the direction of technical change, measured by change in partial productivity ratios, as induced by changes in relative factor prices which, in turn, reflect underlying changes in resource endowments. I have been somewhat less comfortable with the use of the Schmookler-Griliches demand induced technical change model in interpreting the rate of technical change. The rapid rate of technical change in agriculture, as measured by growth in output per unit of total input, in the presence of slow growth in demand, suggests that a richer explanation is needed to understand the rate of technical change.

Observed scale economies in agriculture are, in my view, primarily a reflection of disequilibrium associated with lags in the adoption of new technology. Let me illustrate from the recent cross-country production function estimates by Kawagoe, Hayami and Ruttan (1985), and Hayami and Ruttan (1985, pp. 138-160). These results suggest the presence of economies of scale in developed country agriculture and lack of economies of scale in developing country agriculture over the 1960-1980 period.

Results of a reestimation by Kislev and Peterson, using country dummies, did not find scale economies (Kislev and Peterson, 1986). A more recent reestimation by Lau and Yotopoulos (1987) using transformed first differences, individual country dummies, and a transcendental logarithmic specification finds that returns to scale are positively related to levels of machinery input per farm. Their findings indicate, like those of Hayami and Ruttan, that most LDCs are operating in the region of constant returns to scale and most DCs are operating in the region of increasing returns.[1]

We interpret these results as reflecting the rapid, though incomplete, introduction and adoption of mechanical technology in the developed economies. These mechanical technologies tend to require somewhat lumpy or discrete adjustments in factor-factor ratios at the farm level. In the developing countries, in contrast, the technical changes which were occurring during 1960-1980 were primarily biological and chemical. These technologies were highly divisible and were adopted with little lag between introduction and adoption.

Glenn Johnson had tended to be more than somewhat critical of both our methodology and the interpretations (Johnson, 1984). He has been particularly offended by the weakness of our microeconomic analysis. Furthermore, reanalysis of several microeconomic studies suggests less support for the presence of economies of scale than had earlier been assumed (Hoch, 1976). Nevertheless, it seems quite apparent to me that a microeconomic analysis, based on a sample of firms during a period of rapid advance in mechanical technology, could be expected to find evidence of economies of scale that reflect disequilibrium in factor-factor and factor-product price and use ratios. This view is confirmed in recent studies using individual farm data such as that by Kuroda

(1987). Kuroda found that in post-war Japan economies of scale emerged during two periods of rapid mechanization. The first period, the late 1950s and early 1960s, was associated with rapid increases in small-size machinery. The second, the early 1970s, was characterized by the even more rapid introduction of larger-size machinery.

III

Let me now turn to one of the issues that I would like to see researchers in farm management and production economics confront more directly. There has been, as noted above, a great deal of literature on why farms have become larger. But even larger farms are quite small in comparison with large firms in other sectors of the economy. The interesting question, for which an intellectually satisfactory answer is not yet available, is why farms are so small.

One aspect of this issue is the size of the operating unit. A response to this question is offered in John Brewster's classic, but neglected, article on "The Machine Process in Agriculture and Industry" (1950). Brewster argues that a major difference between the use of mechanical technology in industry and agriculture is that in industry men and machines remain stationary while the materials are mobile; in agriculture, the materials are stationary while the men and machines must be mobile.[2] The effect of mechanization in agriculture is to spread men across even larger areas and thus enhance the problem of supervision. In industry the effect was to concentrate workers in less space and hence increase the number of workers that could be supervised by one manager. A second consequence of the differential pattern of mechanization is that the annual cycle of activity in crop agriculture requires a sequence of specialized machines, each of which is used for a relatively few days per year. The effect is that a fully mechanized agricultural system tends to be much more capital intensive than a fully mechanized industrial system.

A second issue that needs more careful analysis is the effect of risk on farm size. It seems reasonable to hypothesize that the optimal size of the operating unit will be smaller in an environment characterized by high risk, arising from either natural or institutional sources, than in an environment characterized by lower risk. I was surprised, in spite of the recent upsurge of literature on the impact of risk on farm decision making, to find that the issue of the impact of risk on farm size has apparently been completely neglected.

The fact that span of control and risk may limit the size of the farm operating unit is not sufficient to answer the question of what limits the size of the ownership unit. Why do we not see many more large ownership units in which the individual "divisions" are operating units managed by a hired manager, a tenant, or a limited partner? It may be useful to go to the literature on the "agency problem" and "transaction costs" to search for an answer (Williamson, 1967; Grossman and Hart, 1986; Stiglitz, 1974). It simply may not be possible to construct contractual arrangements which are incentive compatible. In a situation where there is a potential surplus, over and above factor costs, to be divided between the owner and agent, it may not be possible to write contracts which simultaneously solve the dilemma of incentives for efficiency and the moral hazard problem.

IV

I would now like to turn to some of the implication of technical change for changes in factor proportions and farm structure. In Figures 1 and 2, we have traced recent and longer-run trends in land and labor productivity and in land/labor ratios for a number of developed and developing countries. The interesting question is where will these trends take us over the next several decades?

The perspective on the possibilities of change has shifted dramatically over the last decade. The mid- and late-1970s could be characterized as a period of considerable pessimism regarding the capacity of agricultural technology to offset the effects of resource constraints. During the 1980s, the potential impact of the new biotechnologies has resulted in considerable euphoria about the prospects for technical change and to the expectation that agricultural commodity prices will remain depressed into the foreseeable future. The fear of scarcity has been replaced by a fear of abundance.

There has been a great deal of speculation to the effect, as a result of advances in biological technology associated with the new knowledge in molecular biology and its applications, that American agriculture may be confronted with a new burst of productivity growth that will substantially exceed the rate of growth in demand for agricultural commodities. It is anticipated that advances in animal health and animal productivity will come first, followed by advances in plant protection and somewhat later by advances in plant productivity. But I see nothing in the evidence presented in the recent rash of technology assessment studies[3] that leads me to anticipate productivity gains over the next several decades comparable to the gains achieved since 1940 as a result of (a) the reduction in farm labor and work-animal inputs associated with advances in mechanical technology and (b) the increases in crop yields and animal feeding efficiency resulting from advances in plant and animal breeding and in crop and animal nutrition.

We can expect a slowing of additional gains from advances in mechanical technology. It appears to me that the cost of saving an additional man-day by adding more horsepower per worker has largely played itself out in countries like the United States, Canada, and Australia. Modest gains in firm-level efficiency and sector-level productivity may still occur as a result of further changes in farm structure (Edwards, 1985; Cooke and Sundquist, 1987). It is, however, time to stop talking as if adjustments in farm size and farm structure or reductions in labor input per hectare, have very much to contribute to either efficiency in agricultural production or to intersector equity in income distribution in the United States.

I am also less optimistic than I have been in the past about the prospects for continued high rates of growth in output per hectare. Increases in crop yields by crop breeders during the last half century have been achieved primarily by selection for a higher harvest index--by redistributing the dry matter between the vegetative and reproductive parts of the plant (Jain, 1986). The harvest index has risen from the 20-30 percent range to upward of 50 percent for several major grain crops. There is growing concern that a plateau is now being reached in yield potential based on failure, under experimental conditions, to push the harvest index much above 50 percent. If this is correct, it means that future gains in those countries that are currently pushing against the technological frontier will have to come from increases in total dry matter production resulting from enhanced photosynthetic capacity. And the biological basis for such advances has apparently not yet been established.

If we can turn again to Figures 1 and 2, it is not apparent whether the countries in the upper left quadrant (such as Japan) and the countries in the lower right quadrant (such as the United States) are moving toward higher land and labor productivity along parallel or convergent paths. If we were moving along convergent paths, the long-run prospect would be for comparable land-labor ratios in farming across countries. At present, however, there does not appear to be any strong tendency toward convergence.

V

Let me now turn to some questions about why the issue of farm size or structure is on the research agenda. First, let me address three reasons that are often advanced.

One reason that is sometimes advanced is the fear that farm structure may become so concentrated that organized producers may be able to extract excessively high prices from consumers. I myself see no reason why consumers should be concerned about this issue. The commodity component of food costs is relatively small and, for those few specialized commodities (lettuce, carrots) where production has or is likely to be highly concentrated, the elasticity of substitution in consumption is reasonably high. If consumers are worried about price effects, they should take a more active role in deregulating agricultural production and rethinking price and income supports.

A second reason that is often offered is that an agricultural system organized around small operating units has a more positive impact on the economic health of rural communities. The classic studies by Goldschmidt (1946) of Arvin and Dinuba in California are frequently cited to this effect. A recent restudy (Hays and Olmstead, 1984) casts considerable doubt on some of the inferences that have been drawn from the earlier study. However, a more fundamental basis for questioning this reason is that it is too late. The number of operating farms is too small to sustain the physical and institutional infrastructure that now exists in most rural areas. Even if there should be no further erosion of farm numbers or increases in farm size, we could expect continued stress on the viability of rural communities that are primarily dependent on agriculture.

A third reason for studying agricultural structure is that it is on the populist political agenda. I would like to think that the populist concerns could be used to redirect agricultural policy in a way that would contribute to greater equity in rural areas--such as the delinking of commodity price and income supports. But it has instead been directed to the support of higher price supports and more severe acreage restrictions. The policies supported by the rural populists would have a negative impact on the competitive position of U.S. agricultural commodities in global markets and would contribute to the worsening of the income distribution in rural areas.

There are a number of reasons why a group such as NC-181 might find it useful to study the changing structure of American agriculture. But unless the purpose of structure studies are clearly identified, the output of the research effort is unlikely to become an input into the resolution of relevant problems. The two objectives suggested below are certainly not exhaustive.

One would be to contribute to the formulation of extension policy. The extension service is being asked to direct its energies to a wider number of clients. I anticipate that the state extension services will be the object of mounting criticism by both traditional and new constituencies over the next decade. One objective of structure studies could be to more clearly identify the clientele and the demand for the extension service in the areas of commercial agriculture, environmental quality and rural governance and development and other areas.

A second objective would be to provide state and local government with the information that they will need to modify their activities to meet the demand and the fiscal capacities of rural areas. Economic and demographic changes in rural areas can be expected to result in a decline in the demand for some services and a rise in the demand for other services. These changes will influence the capacity of governments to provide services.

If I am correct, then farm size and structure studies should be designed to respond more specifically to the information needs of state and local governance institutions and program managers.

Endnotes

[1]The Lau-Yotopoulos reestimation also finds larger coefficients for land and fertilizer and lower coefficients for machinery and education than Kawagoe, Hayami, and Ruttan. In the Lau-Yotopoulos model, the country dummies apparently pick up the intercountry effects of differences in general and technical education plus differences in the country specific factors such as soils, climate, and infrastructure.

[2]"In pre-machine times, farming and manufacturing were alike in that operations in both cases were normally done sequentially, one after another; usually by the same individual or family. The rise of the machine process has forced agriculture and industry to become progressively different in respect to the sequence in which men once performed both farm and industrial operations. For in substituting machine for hand power and manipulations in agriculture, individuals in no wise disturb their pre-machine habit of doing their production steps one after another whereas in making the same substitution in industry men thereby force themselves to acquire increasingly new habits of performing simultaneously many operations in the production process. As a consequence, the 'Industrial Revolution' in agriculture is merely a spectacular change in the implements of production whereas in industry it is a further revolution in the sequencing (order) in which men use their implements" (Brewster, 1950, pp. 69-70).

[3]See, for example, the section on "Emerging Technologies for Agriculture" in OTA (1986) and Charles Benbrook, Dale Jorgenson, Ralph Landau, and Vernon Ruttan, eds. (1988).

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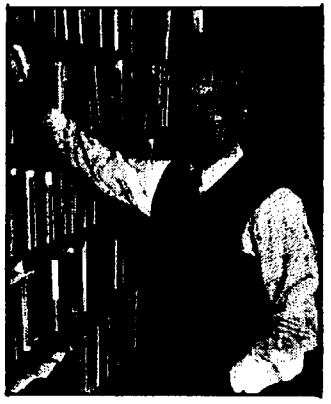
Learning to Teach

By Vernon W. Ruttan



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There has been a good deal of controversy at the University of Minnesota about the quality of teaching by foreign and American graduate teaching assistants. Much of this discussion has focused on the wrong question. The more relevant question is—should graduate students be teaching undergraduate students at all? Do they have the knowledge necessary to provide either lower- or upper-division undergraduate students with an integrated perspective on the subject matter they are assigned to teach?

My own experience leads me to question the use of graduate students—and even assistant professors—in the teaching of undergraduates. Let me illustrate this point by drawing from personal experience.

My first academic appointment was in the Department of Agricultural Economics at Purdue. When I arrived in 1954, I was asked to teach one of two sections in an undergraduate agricultural marketing course. Both sections of the course had previously been taught by Richard Kohls, a more senior associate professor who had taught the course for several years and was the author of a popular text.

During the third week of the term, a delegation of students from my section visited the department head and complained —"We thought we were going to get Professor Kohls!" And this was before the period of student militancy in the 1960s!

I was taken aback. My graduate training was more recent than that of Professor Kohls, and I knew that my knowledge of economics was better as well. What I did *not* realize, until I had acquired a good deal more experience in teaching, was that Professor Kohls' research and consulting had given him a much better understanding of the institutional aspects of agricultural markets. I may have known more about *economics* than Professor Kohls —but I knew less about the *economy*.

At that time there were no formal programs to introduce young staff members to teaching concepts or methods, such as Project Sunrise, which has recently been initiated on the St. Paul campus. I attempted to remedy some of my deficiencies by taking a course offered by the Speech Department. It *did* improve my presentation skills, but it did *not* remedy my lack of personal knowledge about agricultural markets.

I now teach courses dealing with the role of technical and institutional change in the process of agricultural development. I draw on a wide range of personal research and experience in developing countries as well as on the literature on development. There is no way that most graduate students could have access to this same knowledge.

What implications do I draw? *One* is that while good teaching may depend in part on presentation skills, it depends even more on substantive knowledge, and that substantive knowledge cannot be acquired from textbooks alone. It also must draw on personal knowledge and research. A *second* is that the reason we assign graduate students to teach lower-level undergraduate classes is not that it contributes to quality undergraduate education. *We use graduate students to teach undergraduate classes because it is cheap!*

The conclusion I draw is that graduate students should not be used to teach lower-level undergraduate courses. These courses should be taught by mature scholars who can bring a richer background of research and experience to bear in their teaching than is available to their younger colleagues. I do not want to be misinterpreted as arguing that graduate teaching assistants should not have an important role in undergraduate education at the University of Minnesota. They can have a very appropriate role in the grading of examinations and papers, in the direction of discussion and laboratory sections, and in peer advising and counseling. The University also bears some responsibility for training graduate students to become good teachers, but this should be accomplished in an apprenticeship under careful guidance.

Draft
April 8, 1988

CONCERNS ABOUT THE STATE OF THE UNIVERSITY*

Vernon W. Ruttan
Regents' Professor

*Presented at University of Minnesota Board of Regents Hearing on Academic Priorities, April 7, 1988.

In my presentation this morning I intend to focus on five problems or issues. Knowing the emotional stress that you have been subject to over the last month, and the heavy agenda that is before you, I was somewhat reluctant to ask for time on your schedule this morning. The problems that I will focus on have already occupied a good deal of your attention. In spite of some reticence I am here this morning because the issues that I will focus on are of vital importance to the future of the University and the State of Minnesota. Resolution of the first three issues will require large, not marginal, resources. Resolution of the last two will require important changes in the way the University relates to the state and to its students.

My first concern is about the Institute of Technology, more specifically, the engineering units within IT. At present the IT does not have the capacity to provide either the training or the research needed to sustain the development of a state that hopes to use high tech manufacturing and services as a leading sector in state economic development. During the last decade and a half there has been serious erosion of the physical and institutional infrastructure in IT. The faculty is overburdened. Student access is severely rationed. The system is being held together by bailing wire and string. It will take substantial resources to reverse the deterioration of the last decade and a half and even larger resources to achieve excellence. Failure to substantially strengthen Engineering at Minnesota will be costly to the future of the state.

My second concern is that the University of Minnesota College of Liberal Arts is, with a few important exceptions, deficient in both

quantity and quality. The number of line items in many of the best departments are often hardly more than half that of comparable departments at schools like Michigan or Wisconsin. Many departments that were considered distinguished two decades ago are no longer recognized as desirable locations for graduate study.

It is possible for an undergraduate student in some of our departments to go through the University without taking a course from a staff member whose recommendation for entry to graduate school or professional school would carry weight with the department to which the student is applying. While the numbers are not firm, a relatively low number of Minnesota undergraduates pursue advanced or professional or research degrees.

We must also be frank about the heavy use of graduate students in the teaching of undergraduate courses. We use graduate students to teach not because it is effective, but because it is cheap. We are giving our undergraduate students less than they are paying for and less than they deserve.

My <u>third</u> concern is with the library system. The library system is inadequate to the needs of an undergraduate teaching college; it is severely deficient for the needs of a research university. In spite of recent improvements, it remains cumbersome and expensive to use.

Let me now turn to two organizational issues.

My <u>fourth</u> point is that the land grant mission must be viewed as a function of the total higher education system of the state and not simply of the University of Minnesota. It is important for both the economic and the cultural future of the state that the capacity to carry out the land grant mission be enhanced. But in a state as complex as Minnesota, with

its wealth of higher education facilities, the multiple missions cannot be performed with the responsiveness or the quality that the citizens of the state deserve by a single institution. It is important that a more intensive dialogue about the land grant mission be initiated with the other institutions.

My fifth concern is with the proposal for a common entry point of students into the University. In principle I strongly favor this proposal. But for such a system to work, the undergraduate registration and counseling system will need to be substantially upgraded. The system is cumbersome, difficult to access, and frequently an insult to students.

As I reflect on these major needs I find myself exceedingly discouraged when I see references to the effect that with the change in leadership or with the discovery of reserve funds some of the difficult decisions about priorities can be avoided. But it is unlikely that substantial new resources will become available in the next half decade. State Budget and expenditure forecasts suggest increased budget stringency as we move into the early 1990s. Most of the resources needed to achieve the needed reforms will have to be generated internally.

There is a term economists use to describe an institution that cannot respond to the changing needs of the environment in which it lives--the term is bankruptcy! Since the late 1960s the University of Minnesota has been sliding into intellectual bankruptcy. It is my hope that during his interim presidency, Dr. Sauer and the Board will be able to make the difficult changes in organization and administration that will enable a new president to assure the state that the University is in a position to make effective use of the large new resources that will be required to provide

the state with the University it deserves and needs. You have my best wishes as you attempt to maintain the momentum for reform that has been achieved during the last several years.