Trade-offs and Tomorrow

J. B. KENDRICK JR.
Vice President
Agricultural Sciences
Director, Agricultural
Experiment Station
University of
California

CURRENT SHORTAGES and price trends, estimates that our petroleum supply will only last about 30 years, the search for a place to park—all contribute to our sense of frustration and our realization that there really isn't plenty of everything. We have reached a point where it is clear that there is a price or a trade-off exacted for the comfort, convenience, and abundance to which we have become accustomed. As our resources become harder to get and higher in price, the price tag of the future will include choices, changes of attitude, and larger investments. The price will be in the things we give up to gain the other things we need or want.

Clearly, one of the things everyone wants is an adequate supply of food at a reasonable cost. Starting with that assumption, and given the human numbers to be fed, certain other conditions must be accepted. One of them is large-scale agriculture. Few argue against the efficiency of size in other sectors of the economy. No one argues that we should build our own automobiles or that each town should have its own automobile plant. Yet the romantic notion persists that we had best get our food from our own backyard or from the *small* family farm. There is a relationship between scale and production efficiency—between scale and the fact that the average American pays a smaller proportion of his income for food than any other consumer.

Agriculture's continuing ability to keep pace with the food consumption of an increasing population depends on practices that work best with specialized, intensive, large-scale operations. Part of that productivity involves mechanization applied to preparing land, thinning, cultivating, fertilizing, irrigating, harvesting, processing, and handling crops. Part of it is based on the use of chemical tools to keep crops free of disease, insects, and weeds that reduce yield. Part of it is in the fertilizers used to increase yield. Part of this productivity is in new varieties.

These are some of the components of the technological system necessary to produce food for an ever larger number of people. If we accept the benefits, we must be prepared to accept some risks, and some trade-offs, as the price tag. The system involves an interlocking sequence of energy-using processes. Interruption of energy supplies for one part of this system could result in significant reductions in production. For example, natural gas is the feed stock for production of nitrogen fertilizer, an essential nutrient for plant growth. If growers were unable to obtain nitrogen materials for next year's crops, yields in general would drop by an estimated 20%—and for some California crops, considerably more.

As demand outstrips the world's remaining supplies of fossil fuels we may someday face alternatives such as a 20% cutback in our food supply—or a cutback in the energy-consuming, push-button, frost-free, self-cleaning, air-conditioned, automatic existence that everyone got along without a short time ago.

We are beginning to accept the fact that there will be interim trade-offs between considerations for environment and energy production as we develop pipelines and more sources of energy off-shore, in shale, and in nuclear power facilities. We also need to weigh carefully the costs and benefits of ecological constraints on agricultural production.

Should it become necessary to cut back on the use of agricultural chemicals, more land might be required to achieve desired levels of production. More than two million acres of rural land are converted to nonagricultural uses each year. We may have choices to make related to land-use controls, land for freeways, recreation, urban development and food production. The skyrocketing curves of increase—in population and pollution and in demands for food, energy, water, land, and environmental amenities—call for choices based on sound information. We do not have knowledge sufficient to make informed decisions about the future in many areas. We do not have knowledge sufficient to deal with the implications of trade-offs already made. For example, we have traded lower risk for high production in our dependence on vast monocultures to provide grains that are the mainstay of the world's diet.

If we are to protect ourselves against the risks of vulnerability inherent in genetically uniform crops, if we are to develop more effective tools for production and protection of crops, more precision in monitoring environmental hazards, and more efficient use of our resources—then society must also choose to support the search for more knowledge. Without much more research we cannot evaluate the risks, and the benefits, of the many decisions necessary to attain our production and social goals.