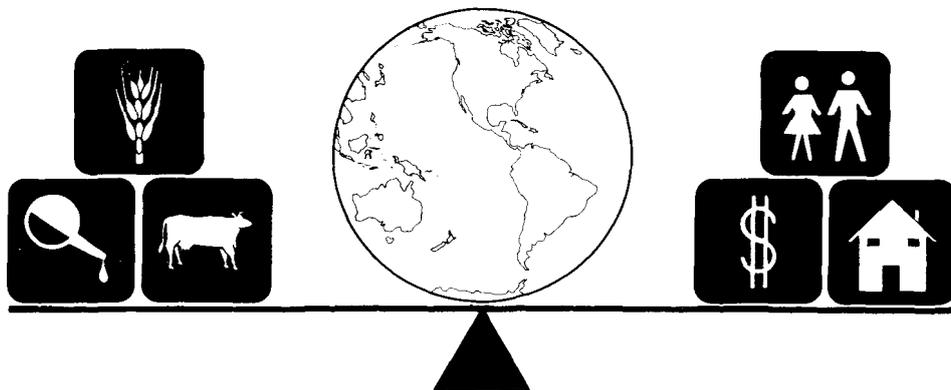


"A HUNGRY WORLD:

THE CHALLENGE

TO AGRICULTURE"



UNIVERSITY OF CALIFORNIA scientists have completed a study of what may well be the ultimate topic in resource planning—the world's future food supply.

The report, titled "A Hungry World: The Challenge to Agriculture," reviews the world's potential requirement for food in 1985, and the possibility of satisfying that need with crops, livestock and food from the sea.

The outcome of a six-month study triggered by the worldwide food crisis of 1973, the report was made at the request of J. B. Kendrick, U.C. Vice President, Division of Agricultural Sciences. The task force of U.C. scientists participating in the study set out to answer such questions as:

To what extent were the food shortages of 1973 the result of continuing forces that might produce another such crisis?

Just what *are* the prospects for world food demand and supply in 1985?

What could the developed nations, including the United States—and institutions like the University of California—do to help solve the world's food problem?

To answer these questions, the U.C.

task force considered scientific viewpoints as diverse as those of plant scientists and animal scientists, demographers and engineers, nutritionists and economists. For instance, in projecting 1985 food supply and demand, the report reflects the outlook of nutritionists, who are concerned with the amount of calories and protein that people need, and the outlook of economists, who are more likely to consider the amount of food people will consume at a particular price level.

There were other complications. In projecting "effective demand" for food production—the marketplace requirement, as distinct from nutritional need—it was necessary to allow for non-food uses (seeds, livestock feed, industrial uses) and losses to pests. Only in this way could total demand be compared with potential total production, and possible shortages or surpluses identified.

No simple answers

Not surprisingly, the task force found no simple answers. But with some qualifications, they did conclude that until 1985 at least, the earth's total food production capacity will be sufficient to feed a population expanding at the projected rate of about 2% a year. Hence, the chief problem in the short run will be

distribution of food among regions of the world.

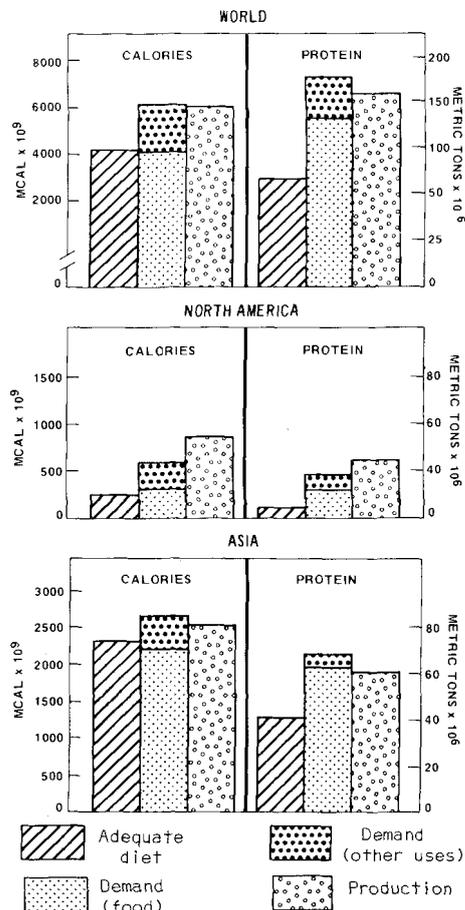
But in the long run, lower population growth rates in the developing countries offer the most promise for avoiding mass famine. In addition, the have-not nations must develop more capacity to produce their own food, or the economic resources to purchase it.

Both Europe and Asia are indicated as major deficit areas for calories and protein, although of course projected shortages have vastly different implications for areas which can afford to buy on the world market, like Europe, than for those which cannot, like most of Asia.

Calorie shortages are expected to be more threatening to the nutritional status of human populations than protein shortages. In fact, the report says, if calorie needs could be satisfied even with combinations of locally available foods of lower protein quality, there would be no protein deficiency.

The outlook for actual food shortages on a massive scale is most grim in Asia. The prospect is less severe in Latin America and Africa, because these areas have more undeveloped resources in relation to their populations than Asia does.

PROJECTED CALORIE and PROTEIN BALANCES in 1985



North America and Oceania are the only regions which are likely to produce substantial surpluses of both protein and calories.

The report says: "The combined potential surpluses in these regions appear large enough to make up all the world's food deficits in 1985, if economic incentives to producers in North America and Oceania are sufficient to meet the world's needs, and if developed countries are able and willing to assist or subsidize the transfer of food."

This would obviously be a vast undertaking. The projected shortfall of cereal grains in Asia, Latin America and Africa in 1985 is estimated at 11%, compared with 8% in 1970. At an assumed price of \$150 per metric ton, it would cost at least \$15 billion for the developing countries to buy that much grain, or for the developed countries to give it.

Worldwide implications

Since a reduction in population growth will take some years at best, increased food production is the most promising immediate solution for the developing countries. However, the worldwide increases in agricultural output of the last decade or two may be slowing down. Better planning, institutional reform, and increased technical aid—carefully adapted to local needs—are urgently needed.

In one way or another, developed countries will probably have to supply massive aid. The report says: "Whether these transfers take the form of commercial trade or food aid will depend upon the purchasing ability of developing countries. Thus, economic growth in all sectors of developing economies is a prerequisite of vigorous international food trade." Direct food aid, the U.C. scientists warn, should not be allowed to disrupt a developing country's domestic markets.

World trade policies will be crucial. Since increased protectionism could seriously damage the developing economies, trade agreements are needed to give developing countries access to world markets with their specialized commodities, such as coffee, cocoa, rubber and bananas.

Energy shortages and resulting high prices for fossil fuels and fertilizer will have a particularly devastating effect on about 40 developing countries that have started moving away from nonmarket economies to intensive, efficient food production and marketing systems.

A worldwide food reserve policy is urgently needed, since large surplus

grain stocks held by the major exporting nations during the past 20 years have largely disappeared. A world food reserve program would maintain emergency stocks against the threat of famine and would manage stocks to mitigate undesirable swings in world cereal prices and trade volumes. This issue is particularly important to the U. S., as the principal world producer and exporter of grain.

The efficiency of food production from animals versus plants is an important but complex question. Plants produce far more protein and calories per acre of cropland than animals. On the other hand, animals convert fibrous feeds and wastes to high-quality human food. They also graze on vast areas where crops cannot be grown. But those animals directly competing for food with humans (such as grain-fattened beef) clearly represent a less efficient use of resources on a global basis.

California's future

The future of California agriculture will be shaped by U. S. and world market conditions, and by growing competition for land and water. The report says: "Agricultural technology has accounted for steady increases in crop yields in California in the past and, on the basis of known technology not yet fully adopted, yield increases for another decade seem assured."

With respect to international trade, the task force believes that high value specialty crops—fresh and processed fruits, vegetables, and nuts—plus rice and cotton will continue to account for most of California's exports. Economic growth rates in Europe and Japan will be important in determining demand for specialty crops, and export demand for rice may increase if the worldwide food crisis continues. Demand for cotton is expected to continue strong. To meet these demands, however, California's agriculture will continue to operate "within an increasingly complex framework of policies and procedures" designed to protect the environment and to increase food output.

The planned rate of irrigation development in California is sufficient, "even in view of expected losses of agricultural land to urbanization," to provide enough irrigated land to meet the projected output of food and fiber in 1985. Acreage of field crops in the state is projected to increase about 6% by 1985; vegetables, melons and strawberries, about 11%;

and tree fruits, nuts and grapes almost 10%. These projections, the report adds, "would indicate a continuation of the trend toward higher-value specialty crops in California. Although increases are noted for grain acreage . . . California is now, and will continue to be, a substantial importer of small grains."

Social policy

The report concludes with some straightforward statements about agriculture and social policy. With respect to land use, the present trend of diverting prime agricultural land to industrial and residential uses "may not serve the long-range public interest." Water, the lifeblood of the state's agriculture, should be looked on as "a finite resource. . . . Recycling by agriculture and industry should be more diligently pursued."

Energy will also continue to be a problem, and "increasing energy use in agriculture should be viewed with greater concern at all levels." The report recommends that "procedures should be devised to preserve and extend the availability of fossil fuels for those vital purposes for which no feasible alternative now exists. Alternative nitrogen sources should also be explored."

In considering the expansion of California agriculture, the task force noted that since "production costs (land, labor, taxes) have climbed rapidly and are higher than many competing areas," double-cropping is one possibility for overcoming this competitive disadvantage.

Finally, California should continue to maintain a "strong, far-ranging and forward-looking agricultural research program," committed to removing the barriers "constraining future food production and rural development."—**Ray Coppock.**

The U.C. task force was headed by Agricultural Economist Harold O. Carter at Davis. Members were: George M. Briggs, Professor of Nutrition (Berkeley); John R. Goss, Professor of Agricultural Engineering (Davis); Maurice L. Peterson, Professor of Agronomy (Davis); Davis W. Robinson, Professor of Animal Science (Davis); Seymour D. Van Gundy, Professor of Nematology and Plant Pathology (Riverside); Pran Vohra, Professor of Avian Science (Davis); and James G. Youde, Extension Economist (Davis). George Hellyer, Special Assistant to the Task Force, and R. H. Coppock, Educational Communicator, also contributed to the report.