

6. Other Food Sources

Plants and animals not commonly used as sources of human food could be used to a greater extent. Rational use of the seas and inland waters could contribute substantially to nutritional needs. Fortified and synthetic food will play an ever-increasing role in meeting the food demands.

7. Continued Research and Education

The great expansion in total world food production in the last two decades built upon the basic and applied research of many decades. It is essential that a continuous program be carried out to add to the store of human knowledge and that it be applied to the problems of the demand and supply of food. Once this information is available the difficult problem of transfer in an operational format to the food procedures and consumers throughout the world must be solved.

8. Changes in Infrastructure

Although food demand and supply problems will rank as fundamental considerations of future human populations, their lives will be structured by a series of

institutions that are necessary for societies to exist at all. Systems of government, law, education, transportation, communication, and property ownership, all are examples of elements of an infrastructure that evolves in a complex society. Adaptations must and will occur in these institutions. The primary goals of such institutional changes should be to stabilize human population numbers and to enhance the quality of human life within limitations imposed by the physical phenomena of our earthship.

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World Food Situation

Perspectives for Students in Agriculture

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Abstract

This paper presents some facts regarding the world food situation, discusses the implication of food shortages, identifies factors contributing to the present world food situation, and reviews proposed solutions. A high priority on enhanced production of food, combined with population control and improved utilization of existing commodities in by-products can result in a world where people are better fed than at present. Although these approaches may be feasible from a technological standpoint, they are complicated by the social, religious, political, and economic factors that influence food production capabilities and food consumption patterns. Obviously agriculture students will find themselves confronted in their careers with unparalleled world food problems and must have some comprehension of what lies ahead.

Food and People — Some Current Facts

Critical food shortages currently exist in several regions of the world. Dr. John Hannah, administrator of the World Food Council, recently reported that 10 percent of the world's population is facing chronic hunger (2). Because of unequal distribution of the world's food supply, this translates to 25 to 30 percent of the popu-

lation who are facing severe food shortages in some regions of the world.

It is generally acknowledged that we are now in the tightest food supply situation since World War II. World grain reserves, which were as high as 95 days' supply in 1961, fell to 22 days' supply in the fall of 1974, and were projected to be approximately at an 8-day supply by late spring of 1975. This is the equivalent of "pipeline levels" of grain (5).

To illustrate the unequal distribution of food, consider the fact that U.S. citizens consume on the average the equivalent of one ton of grain per person per year in the form of cereal grains and feed grains in the form of livestock products. Annual per capita consumption of grains in the developing countries is approximately 400 pounds, or about one-fifth of the per capita consumption in the United States. The unequal distribution of food is most critically seen in the area of quantity and quality of protein available to people of the developing nations.

In projecting future demands for food, increased population pressure must also be considered. World population is now approximately 3.8 billion persons. Figures from the World Food Conference indicate that this figure will be approximately 8 billion persons in the year 2000. This means that, in order to stay even, we

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must double the present production of food on a worldwide basis within 25 years; to improve the present situation will require substantially more than twice present food production.

Implication of Food Shortages

The nutritional implications of the present shortages of food are ominous. Total food shortages (that is, insufficient supply of energy or calories) in a given country may result in widespread hunger among the population and starvation for many. Again quoting from Hannah (2), as many as 10,000 persons may die of starvation each week in Asia, Africa, and Latin America. Tens of thousands already have died, and many thousands more will die from the direct and indirect effects of food shortages.



Also of concern are the effects of protein deficiency on physical and mental development. Serious protein deficiencies may result in high rates of infant mortality, stunted growth, low work output, and reduced life span. Clinical stages of protein deficiency are evidenced in the condition of "kwashiorkor," characterized by limited muscle development, distended stomach, slow growth, and listlessness among infants and children. Recent studies have indicated that protein deficiency during development of the fetus and up to two years of age may seriously affect mental development. It has been demonstrated that additional brain cells are not formed beyond age two (3). Although providing diets adequate in protein after two years of age may correct severe physical symptoms of protein malnutrition, impaired mental capacity which might have resulted will not be restored. In certain regions of the world, a high proportion of persons with impaired mental development may result from protein deficiencies. The ability of these populations to solve the serious social and technological problems with which they are faced may thus be limited.

Contributing Factors

With startling speed, our concerns have changed from abundant surpluses to food shortages. This transition resulted from a culmination of many longer-term problems during 1972. In 1972, total food output declined on a worldwide basis for the first time in over 20 years. For example, total production of cereals was down approximately 33 million tons as a result of adverse weather conditions in various regions of the world. Stocks of cereals of exporting countries fell sharply.

A second factor was the increasing affluence in many regions of the world which raised the demand for better diets containing meat and other livestock products. The Soviet Union, faced with reduced production because of adverse weather conditions, made a conscious decision to import substantial quantities of cereals for food and feed grains rather than liquidate livestock populations that had built up gradually over a period of years. Increasing affluence in developing countries also contributed to increased demands for food. In these countries, a high proportion of each new dollar of income goes for food expenditures.

Correspondingly, major food exporting countries such as the United States and Canada made policy decisions to increase the sale of food and agricultural products in international trade. These policies reduced the huge surplus of grains that existed.

Complicating these various developments were the sudden emergence of shortages and dramatic cost increases in oil and fertilizer, two essential ingredients of agricultural production. This has seriously affected the ability of developing countries to increase their agricultural productivity because of inability to purchase necessary quantities of these resources. The seriousness of this can be noted in those countries sited as being part of the so-called "green revolution," who are now falling behind their expected food production goals.

Numerous other factors, such as the impact of reduced harvests of anchovies by South American countries on the total supply of protein in world markets, have also influenced the present world food situation. The continuing rapid increase in world population is certainly a significant factor. The annual rate of population increase in various regions of the world may not seem very dramatic when considered as percentages, but when converted to doubling times as low as 17 to 18 years in some regions, their significance is much clearer.

Some Proposed Solutions

The magnitude of the food shortage problem is rather difficult to comprehend. Borgstrom (1) has indicated a need to double food supply to adequately feed the present population of the world, not considering future population increases. Hannah (2) indicated a need for annual increases of 25 million metric tons of cereal grains. It has also been reported that India alone needs 8 to 10 million metric tons of food in the immediate future to prevent starvation of 30 million people.

Several solutions to our present dilemma have been proposed. The most common are:

1. Development of new lands for agriculture.
2. Increased production, by higher-yielding varieties, improved production technology, and so on.
3. Expansion of economic resources used for world food production.
4. New foods from unconventional sources.
5. Land reform programs to improve efficiency and productivity of agriculture.
6. Decreased waste of agricultural commodities and food products through improved marketing and handling.
7. International cooperation in development and transfer of agricultural production technology.
8. Population control to reduce the rate of increased demand for food.

All of these options will likely be required to improve the present world food situation and to meet future world demands. For example, new lands are available for development in many regions of the world. Frequently, these may be marginal lands, and cost of development will be high. Increased food production through new varieties and new technology is also feasible. At the same time it must be recognized that many new varieties are highly technology-dependent, and the cost of irrigation and fertilizer technology have increased dramatically because of recent shortages and cost increases for oil and fertilizer.

Efficiency of utilization of agricultural commodities and food products can be improved substantially. Losses as high as 30 to 35 percent of agricultural commodities through destruction or damage by insects, rodents, microbiological spoilage, and so on are common. In the United States annual losses by these causes have been estimated between 5 and 7 percent. However, a recent survey pointed out that as much as 25 to 30 percent of the food entering homes in this country was being discarded as garbage.

Improved utilization of existing commodities and other potential sources of human foods offer great promise for the world food supply. The technology of fractionating commodities and by-products and using the various components to their best advantage is rapidly emerging. For example, protein concentrates and isolates suitable for human feeding can be recovered from a variety of commodities traditionally used as livestock feeds. The result is a protein concentrate that is suitable for incorporation directly into human foods, and a feed residue material that is ideally suited for conversion to high-quality protein via ruminant animals. Major attention must be given as to how animals are used as a food resource to minimize direct competition for feed resources that can be used directly by man.

Certainly, population stabilization is a key to our long-range ability to provide adequate food. The results of the United Nations Population Conference, held in 1974, were very revealing of the negative attitudes that exist in many regions of the world regarding population control. It has been suggested (4) that population control ultimately results from increased standards of living within countries. With the rapid population increase in certain regions, present food shortages, and economic instability, it is questionable that living standards in many regions can improve rapidly enough to attain the necessary degree of population control to avoid mass starvation. World food and population experts generally agree that it is technologically feasible to adequately feed the present and a greatly expanded world's population. Doing so is a matter of priority. If a high priority is established for providing an adequate diet to the citizens of the world, production of food on a worldwide basis would be dramatically increased. This would require substantial economic investments in the development of agricultural lands and increasing their productivity, and would require some guarantee of reasonable economic returns to those engaged in food production. Increased investments in food production, increased cost of food, and emphasis on more equitable distribution of food and resources will also necessitate some adjustments in the priorities of the developed countries of the world. Examples of over-consumption and waste of resources are numerous, and adjustments must be made if the world's population is to receive adequate food.

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