



"Hunger allows no choice...
We must love one another or die."
—W. H. Auden.

—Werner Bischof (Magnum).

THE MATHEMATICS OF HUNGER

By CARL BAKAL, a writer and consultant on public affairs who was involved last year in the preparation of an international conference on the world food problem.

IF YOUR eating habits are those of the average American, you down four and a half pounds of food a day—somewhat more than you should.

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Like most Americans, you probably also eat too much fat (which makes up 40 per cent of the U.S. diet), but otherwise your diet is fairly well balanced and is as remarkable for its diversity as for its quantity. Furthermore, as an American you can buy more food—and a greater variety of it—for a smaller percentage of your income than any other people in the world. Only 19 per cent of your take-home pay goes for food, compared to the 60 per cent a Russian

spends or the 80 per cent a Nigerian is forced to pay out.

Responsible in good part for this is the awesome productivity of U.S. agriculture. With less than one-tenth of our people working the land (by contrast, farmers comprise almost half of Russia's population), we turn out literally more food than we know what to do with. Our food supplies are in such great abundance that they have caused embarrassing bulges in both warehouses

and waistlines; an estimated 50,000,000 Americans—almost one in three—are overweight to the point of obesity. So surfeited are we with food that it is sometimes easy to forget that most of the world's people go to bed hungry every night and, in fact, subsist on a diet that would quickly reduce the average American to skin and bones.

The average citizen of India, for example, eats a total of one and a quarter pounds of food a day—less than you may put away at a single meal or while consuming a good-sized steak. In terms of the units commonly used to measure food intake, this is about 1,500 calories, far below the U.N. Food and Agriculture Organization's minimum standard of 2,700 calories daily. (The U.S. average is 3,200.)

As every Metrecal veteran knows, diets low in calories, although trying, can be quite satisfactory—at least for a limited period of time. But over a lifetime the typical Indian diet is inadequate not only quantitatively, but qualitatively as well. The Indian lives largely on starchy food such as cereal grains; rice, in fact, constitutes 85 per cent of his daily diet. He eats relatively negligible amounts of meat (no more in a year than you eat in a week). Absent, or present to only a limited extent, are other protein-rich foods, particularly those of animal origin (fish, eggs, milk) and the vitamins and minerals also deemed essential to health, growth, and vigor.

With the content of animal protein in a diet perhaps the most significant index of its quality, the differences in various parts of the world are rather striking. In the U.S. the average daily intake is sixty-five grams. In Europe per capita intake is somewhat lower, but still quite a bit over the thirty grams accepted as the minimum requirement for adequate nutrition. In most other areas of the world, the figures fall far short of these requirements; in Peru, for example, the figure is thirteen; in Ceylon, nine; and in India, six. In India, a daily diet of 1,000 calories is not uncommon; for most adults, this means virtual starvation. As someone once observed, "It is too much to let you die quickly; it is too little to let you live long."

No one knows exactly how many hungry people are in the world, but evidence based on studies by the FAO (Food and Agriculture Organization) and other authoritative sources indicates that from one-half to two-thirds of the world's present three billion people are seriously underfed or malnourished, often to the point of starvation. Most of these people live in Asia (where more than half the world's population is concentrated) and in much of Africa

and Latin America. To a lesser extent, they may also be found in Europe—even in the more prosperous countries there and elsewhere. Seeing that all of these hungry are properly fed is considered by many to be the most pressing problem confronting humanity today—and one that may concern the well-fed American more than he realizes.

Even if man does not live by bread alone, the history of man is, in a sense—to quote a distinguished social scientist—"the history of his struggle for daily bread"—and, unfortunately, of his often futile efforts to get it. Since earliest times, hunger has been a major factor in man's migrations. The settling of America was to a large extent the result of European food shortages as manifested, for example, by such calamities as the Irish potato famine; and still fresh in history's headlines are similar events in China and Brazil where people have been fleeing from hunger in hordes reminiscent of scenes of a Biblical exodus. And when people are hungry, there is also the seedbed of social and political unrest, riots and revolution, even war—hot and cold.

ACTUALLY, more people have been killed by famine than by war. Fortunately, famines no longer decimate entire populations. Nevertheless, during the post-World War I era, 12,000,000 Russians starved to death in the wake of the Communist revolution, and as recently as 1943, famine claimed 3,000,000 lives in India and another 3,000,000 in China. Yet these numbers are small when compared to the number today whose lives are ravaged by rickets, pellagra, scurvy, goiter, kwashiorkor, and other nutritional deficiency diseases.

That there should be any starvation at all seems ironic in view of America's great abundance. In fact, faced with costs of \$1,000,000 a day just to store our present huge surplus of food, we should not find it difficult to understand what Secretary of Agriculture Orville Freeman has called our "crisis in abundance."

The inevitable question arises: Why, if we have more food than we can use in the United States, don't we send it to the hungry in other parts of the world?

If the United States and the relatively few other food-rich nations are unable to feed the world, it has not been for lack of trying. Since 1954, the U.S. alone has given away or sold on special terms \$10 billion worth of food and other farm products. Our aid and trade of this sort, which now amount to \$1.5 billion annually, supplement the food resources of over 100 countries with a combined population of 1.3 billion people—over one-third of the human race.

Valuable as such help is, it is not enough. Nor could more such help provide other than a limited—and, at best, only temporary—solution to the hunger problem. Even if this country's entire annual food surplus were shipped abroad, it would give each of the world's hungry the equivalent of just one cup of rice a week.

Moreover, getting this food to the people who need it would be staggeringly difficult—for one thing, because of the lack of transportation and storage facilities in many areas abroad.

Also serving to frustrate large-scale distribution efforts would be a complexity of additional barriers—the product of cultural, social, religious, economic, and other factors. In certain areas, rice-eating people (who make up half the world's population), though starving, may refuse to accept wheat, one of the grains now in significant surplus (others: corn, barley, oats, sorghum, millet); if accustomed to brown rice, they may even refuse white rice as a substitute, according to leading anthropologist Margaret Mead. Because of religious scruples, most Hindus will not eat beef, and orthodox Jews and Moslems shun pork. Dietary proscriptions among certain peoples of the world even apply to such foods as eggs, oranges, and milk.

Needless to say, the distribution of large food stocks must be achieved within the framework of certain perhaps harsh economic realities. For example, the foods must be shipped, whether by aid or trade, without disrupting the economies of other countries exporting similar commodities, or the economic structures of the importing nations.

MOST important, surpluses would soon be consumed by a world whose population is continually increasing at an unprecedented rate.

The entire world population numbered only one billion in 1830; it took another 100 years for it to reach two billion. Since 1930—in little more than thirty years—it has climbed to its present three billion level, thanks to the relatively recent medical and other scientific advances that have improved health, prolonged life, and reduced infant mortality.

Right now, with the tick of every second, three babies are being born the world over. Every day brings forth some 260,000 new mouths to feed, every week nearly 2,000,000. Of significance, too, is that populations are rising fastest in the very areas most short of food. By the year 2000, when the world's total population is expected at least to double, there will be two and a half times as many people in Asia as there are today. In Latin America, where the

rate of increase is even higher, the population will almost triple. Mexico's 33,000,000 will double in only the next twenty years.

Although the problem of hunger is as old as man, this population explosion gives it a sense of urgency as never before. The problem now is actually a double one: that of providing adequately not only for the estimated 1.5 to 2 billion who now go hungry, but also for the billions more to be born.

The magnitude of the problem is indicated by several estimates of the world's future food needs. To bring the diets of everybody up to reasonably adequate levels, present production of cereal grains must be doubled and that of animal products quadrupled by the year 2000. In the next twenty years alone, the consumption of fruits and vegetables must be tripled.

PESSIMISTS argue that the achievement of such goals is hardly likely. They point out that even today food production—inadequate to begin with, and although expanding—is barely keeping pace with population growth in many areas. Some, such as naturalist Fairfield Osborn, say that man, by looting the land of its minerals, overgrazing and denuding it of its grass cover, and, in general, overworking its worn-out soil, is plundering his planet and will ultimately destroy its capacity to produce food.

Others say that the practical limits of soil utilization have already been reached and that there is too little land to feed too many people; still others, that birth control is our only salvation; and some, like Sir Charles Darwin, that with or without birth control, humanity will breed itself into chaos.

A more optimistic majority, however, thinks otherwise. Without belittling the eventual danger of an accelerating population, the optimists feel that (as one puts it) "the race between soil fertility and human fertility" can be won, and point out that some of the most densely populated parts of the world are also among the best fed. The Netherlands, the most densely populated country on earth (with 880 people per square mile, compared to India's 312), not only feeds itself well, but also exports over one-third of its agricultural products.

In fact, many authorities are of the opinion that the earth could now feed two to four times and—according to one leading agronomist—even ten times its present number of people; and few will hazard even a guess as to the limits of its future productive capacity.

Among the facts optimists offer to support their views are the following:

At present, only one-tenth of the land surface of the globe is being culti-

ated. Although much of the remainder is, of course, too dry, too cold, too mountainous, or otherwise unsuited for the support of crops (or livestock), the land under cultivation could easily be doubled, experts say. In Ethiopia, for example, more than 180 million of the world's most fertile acres lie fallow. And Israel's once-barren Negev already indicates how even the desert can be made to bloom.

EVEN without opening up new arable lands, food production could be increased tremendously with better and more advanced farming tools and methods. Incredible as it may seem, most of the world's farmers still work the land in much the same way as their ancestors did in Biblical times; more than 70 per cent have a hoe or a wooden plow as their only tool. Relatively few of the remainder use such modern forms of horsepower as the tractor, with which an American farmer can do the work of fifty Asian farmhands—and do it better.

The use of more fertilizers, improved seeds, better irrigation, crop rotation, and other such agricultural techniques could also mean higher crop yields, even on supposedly worn-out land depleted by centuries of use. The importance of fertilizer as a factor in food production is demonstrated by a classic experiment at the University of Illinois. Since 1875, two test plots of corn have been planted there, one treated with fertilizer and the other left untreated. The average yields have ranged, respectively, from more than 100 to as little as sixteen bushels per acre. Also not to be underestimated as a factor in increased crop yields is the miracle of hybrid seed, accounting as it does in good part for U.S. corn yields that double and triple those of many other countries.

Increasing yields is not enough. Crops must also be protected from pests, parasites, and mankind's other rivals for survival. In the U.S. alone, one-tenth of all the food crops planted are destroyed before they can be harvested, and more are devoured while in storage. On a world scale, more than one-fifth of the food intended for man never reaches his mouth. According to the FAO, the annual losses due to rats, insects, and fungi amount to 33,000,000 tons—enough to feed the entire population of the United States for a year. Modern chemistry, in addition to giving us commercial fertilizers, has already furnished effective weapons to combat many food destroyers.

Vaccines could also be helpful in controlling the many contagious diseases that constantly threaten the world's meat and poultry supply. In

India alone, rinderpest, the greatest killer of livestock in Asia and Africa, wipes out 200,000 head of cattle annually. Improved breeding and feeding methods would not only relieve impoverished populations of the burden of supporting unproductive existing stocks, but would also raise yields of milk, meat, and eggs.

Scientists feel that if all the techniques of modern agriculture were applied intensively to the world's land now in use, the total food supply could probably be doubled.

Even greater food possibilities lie in the world's waters, a vast food hamper of practically inexhaustible—and still unknown—resources. Although water covers more than 70 per cent of the earth's surface, it yields less than 1 per cent of our food supply. With improved methods and equipment it could provide much-needed, low-cost nutrients for a protein-starved world.

There are also possibilities in new types of food, or at least hitherto unused foods. Trash fish, which now represent one-half of the world's total fish catch, can be used to make a high-protein fish flour. Enough to eliminate the protein deficiency in one Indian would cost less than \$1 a year, against the \$6 to \$15 a year—or a significant fraction of his \$60 annual income—the same amount of protein would cost if supplied from other animal sources. Other possible products of marine husbandry are plankton—microscopic forms of animal and plant life—and, particularly, algae, or seaweed. Chlorella, an alga that tastes something like spinach, has a protein content of nearly 50 per cent, six times as much as rice. Enough could be grown in an area five miles square to fill the protein needs of 80,000,000 people.

ALL these possibilities lead to one fairly obvious conclusion. The only effective solution to the world food problem can come by exporting to the underfed countries not surplus foods so much as the knowledge, techniques, and tools that have produced these surpluses. There is nothing new about this view, which is succinctly summed up in the old Chinese proverb: "If you give a man a fish, you feed him for one day; if you teach him to fish, you feed him for many, many days."

Demonstrating this principle and the achievements possible through the use of new scientific techniques in agriculture is the spectacular example of Japan. On what little land it has (Japan ranks first in density per unit of arable land), Japan has increased its agricultural production over one-third above its prewar level, and its crop yields are four times those of India. Largely

responsible for these big differences is the Japanese farmer's greater use of fertilizer, pesticides, mechanization, better seed, irrigation, and other efficient products and techniques.

True, many other factors, often closely interrelated, also affect food productivity. Japan's postwar agrarian reform (which reduced farm tenancy from 46 per cent to only 10 per cent of arable acreage) also gave its farmers the incentive to produce more; in India and many of the Latin American countries, the sharecropping or similar systems of farming now used are further obstacles to plenty. And where the farmers are fortunate enough to own the land they cultivate, they may not have the money to buy fertilizer or better seed and tools, or the knowledge necessary to use what they can afford.

CERTAINLY, food productivity cannot be isolated from the rest of a nation's economy, or, for that matter, from any aspect of its life, for many are the handmaidens of hunger: poverty, low living standards, disease, illiteracy, and outmoded customs, to name only a few. Together they all form a vicious circle, typified by the recent observation that in many countries people "are undernourished because they do not work and they do not work because they are undernourished."

To break this cycle—and bring about freedom not only from hunger but also from want and other evils—we must have the cooperative efforts both of the nations in need and of all others concerned with human welfare.

Spearheading these efforts is the United Nations, which in 1945 set up the FAO to help the peoples of the world in their age-old continuing fight against hunger and malnutrition. In 1960, the FAO also launched a comprehensive Freedom from Hunger campaign aimed at intensifying its various programs, which embrace three major types of activity: the collection, analysis, and dissemination of information pertinent to food and agricultural problems; the promotion of cooperation among countries in the same region, or among those facing the same problem; and the provision of technical advice and assistance to individual countries.

Since its inception, the FAO has sent almost 3,000 experts to more than sixty countries to help them deal with the wide variety of conditions responsible for food shortages. FAO experts have helped fight rinderpest in Ethiopia, where the disease until recently killed as many as 2,000,000 head of cattle annually, and set up a poultry improvement program in Cambodia that cut

chicken mortality by one-third and raised egg output by 50 per cent. An FAO seed campaign some years ago helped increase Yugoslavia's wheat production by 30 per cent and Egypt's rice yield by 185 per cent, and helped double and triple rice yields in some countries of the Far East. Other FAO programs have helped battle the desert locust in the Middle East, plan and construct irrigation works in Iran, introduce mechanization in Afghanistan, and provide nylon nets for ill-equipped fishermen in various parts of the world.

Self-help is, of course, the aim of such programs. It is recognized, however, that many nations need, in addition to technical aid, food and other help to tide them over until they can help themselves. To this end, member nations of the U.N. are contributing surplus foods, services (such as shipping), and cash to a new, historic \$100 million World Food Program. The contributions are to be used, among other things, to meet emergency needs during famine, correct chronic malnutrition, and stimulate economic and agricultural development.

SIMILAR in purpose is the U.S. Food for Peace Program, which, from American surpluses and donations and distribution efforts of CARE and other voluntary relief agencies, helps supply some 35,000,000 youngsters in eighty-three countries with nutritious school lunches (added bonus: increased school attendance), and uses food as partial payment of laborers on public works projects. Well known, of course, is the work of the United Nations Children's Fund (UNICEF), notably its distribution abroad of about 100 million pounds of skimmed milk powder annually—donated, incidentally, largely by the U.S. and Canada.

However, because of the constant realization that food aid is at best a temporary measure, local facilities are used wherever possible. UNICEF and other U.N. agencies have assisted local governments in setting up some 200 milk processing plants around the world. Not all deal with such a prosaic commodity as cow's milk; near Bombay a 20,000-farmer cooperative runs the world's only plant that processes water buffalo milk.

Where no milk at all is available or is an expensive luxury, the U.N. advises on the use of substitutes, preferably protein-rich resources that are available locally. Thus, in Indonesia, children enjoy and thrive on Saridele, a vegetable milk which, though it looks and tastes somewhat like the milk we know, is made of a mixture of soybeans and sesame seeds fortified with vitamins and minerals. To combat kwashiorkor in re-

gions of Central America where corn is a staple, a fortified cereal mixture, Incaparina, has been developed. Made of cornmeal, ground sorghum, and cottonseed flour with a dash of vitamins and minerals, it closely resembles in taste and texture the traditional cornmeal gruel on which local mothers traditionally weaned their babies. A daily ration, sufficient to meet all the protein requirements of a young child, costs only three cents.

Some private firms as well as foundations have also begun to help through research, products, personnel, and funds. Some years ago, for example, the Outboard Marine Corporation joined with the FAO in a world-wide campaign to mechanize small-boat fishing. In Ceylon, engines donated by the company and fitted to outrigger canoes enabled local fishermen to boost their catch by 580 per cent.

Endorsed by a number of food industry groups are two dramatic proposals made by William T. Brady, chairman of Corn Products Company, at the Fifth International Food Congress in New York last September. One proposal, calling for a "Marshall Plan type of effort for the world's hungry," suggested the establishment of a permanent committee to provide technical, research, and other industry services to the FAO; the other suggested the designation of 1965 as a World Food Year, comparable in scope to the recent International Geophysical Year.

No longer can anyone afford to be unconcerned with the fact that so many in the world still go hungry, for although food may provide only one key to peace, there can be no peace in a hungry world. As B. R. Sen, the FAO Director-General, has said: "One man's hunger and want are every man's hunger and want. One man's freedom from hunger and want is neither a true nor a secure freedom until all men are free from hunger and want."



—Werner Bischof (Magnum).

A Change of Chemistry

By SHERMAN B. CHICKERING, editor of *The Moderator*, a national student magazine.

SMALLER even than the so-called little magazines are the literary magazines edited by college undergraduates. Unlike their larger counterparts, the literary quarterlies, the college literary magazines circulate only from 100 to 4,000 copies to students, parents, and professors. Although further limited by shortages of time, money, and talent, these magazines perform an important, if often misunderstood, function in most of the nation's 1,600 colleges and universities.

The student literary magazine is frequently regarded as a spawning ground for great literary talents, and there is some truth to this notion. Edgar Allan Poe, Sinclair Lewis, F. Scott Fitzgerald, and T. S. Eliot were first published in undergraduate magazines, and many other great and near-great writers had a similar literary baptism. Campus magazines have served as the one place where the young writer of promise can freely experiment and fumble for a "voice" without having to meet rigorous critical standards.

But this function is incidental, if only because so few undergraduate writers

ever achieve prominence in the profession. More important, college magazines provide many students with a most necessary part of their education as writers. Nowhere but in the student magazine can the undergraduate experience what Cleanth Brooks calls that "change of chemistry" that a writer experiences when he sees his work in print. Once published, the young writer comes to view his work as public property, as something to be appreciated or criticized by his peers. He learns the art of communication in a way that no creative writing course can teach him. The literary magazine educates the reader, too. It enables its public to share in the private vision of a friend or contemporary. It offers, perhaps, a chance to evaluate in the work of a few students the esthetic convictions of a generation. Thus the college magazine need never give birth to a genius to be of value, a fact sometimes recognized only by student editors.

Fortunately for young writers and editors, most colleges recognize the value of the student literary magazine, at least by giving it subsidies when necessary. They levy a tax on students that provides for all undergraduate activities, including the literary magazine. Nevertheless, subsidized magazines are usually expected to sell sub-

scriptions and sometimes to take in advertising. Most magazines, whether subsidized or self-supporting, must therefore cope with the potential disapproval of both their readers and college authorities.

On small campuses this problem is less acute; there the literary magazine is usually more involved with college life than on large campuses, and publishes the works of writers known to more students. On large campuses, however, the editor feels successful if he sells to one out of twenty students. Free enterprise does not often produce a good college magazine, except on those small campuses that provide the necessary support. In addition, editors find that academic pressures prevent their spending time on any aspect of publishing other than content and makeup.

The editor's foremost problem is usually that of finding good material. As a rule, the manuscripts he receives are inferior. He must seek out the best writers on campus and cultivate them assiduously if he is to publish a noteworthy magazine. The best writers will require kid-glove attention because they tend to write for money, to try for big-name publications, and to be sensitive about showing their works to their peers.

The campus itself often discourages an enterprising editor. He sometimes feels that his magazine is an island of creativity in a sea of apathy and academic specialization. The editor of Princeton's *Nassau Lit* says, "We often feel obliged to prove that art is pragmatically useful in order to justify our place on campus." Specialization stifles the arts when classwork deprives a promising writer of the time and training required to produce pieces for the magazine.

Institutional help in overcoming these obstacles is increasing, however. Many colleges now enjoy the services of a writer-in-residence who, while not effecting a cultural renaissance, at least acts as an *éminence grise* behind much student writing. In addition, creative writing courses are offered on most campuses, often supplemented by extracurricular writing workshops.

Writing courses and their instructors, however, do not necessarily directly support the undergraduate magazine. The responsibility for developing a productive relationship with both the instructor and his students remains with the magazine editor. In fact, most of the best magazines maintain general excellence largely because the editor assumes this responsibility. At Trinity College, for example, the editor and faculty advisor work together in conducting biweekly sessions for students who wish to refine their writing. This

COLLEGE LITERARY MAGAZINE CONTEST: As Sherman B. Chickering's article on this page makes clear, U.S. college students publish dozens of first-rate literary periodicals. In order to give recognition and encouragement to these publications, SR's editors and the U.S. National Student Association are this year jointly initiating an annual contest for college literary magazines. Announcements giving details of the competition have been sent to some 600 campuses.

This year's awards for campus literary magazines and their contents, covering material published during the 1962-63 academic year, will be given for the best single issue of an undergraduate magazine, for the best short story, for the best nonfiction piece, and for the best poem written by an undergraduate. Campus editors are urged to choose single entries in one or more of the four categories, and to forward four copies of each nomination to the address given below.

The winning magazine will be given a commemorative plaque and a cash prize of \$250. Winners in the individual categories will receive a hand-lettered scroll, and the winning poem will be published in *SR*. The contest deadline is April 30, 1963; the awards will be announced in a forthcoming issue of *SR*. All entries and inquiries should be addressed to: Magazine Contest, U.S. National Student Association, 3457 Chestnut Street, Philadelphia 4, Pa.