
WILL WE HAVE ENOUGH FOOD AND FIBER?

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The question, "Will we have enough food and fiber?" is perhaps the simplest of those discussed at this symposium. If the question had only specified "WHEN?" I think it could be answered in one word, "NO," though that would hardly be helpful.

At a time when we have in storage almost an entire year's crop of wheat, when the face of the Midwest is dotted with cribs bulging with stored corn, when similar stories can be told for practically every food product, it may seem absurd even to raise the question.

So far as food supplies for this country alone for the next 25 years are concerned, it is absurd to raise the question. If in some gigantic migration another hundred million people should be dumped into our land tomorrow, we could feed them. They would not eat steak, but they could be fed, and nutritionally well fed.

Ten years ago Dr. Firman E. Bear, then president of the American Society of Agronomy, gave as his presidential address "Food for Thought about Food." In this he summarized what we knew at that time about the possibilities of expanding supplies.

I wish to summarize just a few of them to suggest the possibilities: (1) The greater use of fertilizers can produce increases in food production almost beyond imagination. This is, indeed, the source of today's surpluses. We have less land in corn today than we had 50 years ago, though we produce much more today. (2) Higher yielding crops produce similar results; the development of hybrid corn increased the potential yield by more than 20 percent. (3) We can put crops on land that is not now in crop production, in the southeastern part of this country, by irrigation, in the world by developing use of tropic lands. (4) An important share of our present production is prevented or destroyed by weeds, insects, and plant and animal diseases. These are being rapidly controlled by chemical and other means. This has led to important increases in food production and will continue to do so. (5) We are conserving water, both in the arid and in the humid regions, to an extent not previously dreamed of. The mere matter of a monomolecular film on irrigation reservoirs in the West to reduce evaporation will save enough water to produce food for many thousands of people. (6) We are controlling erosion, which is still, despite what we have just heard of the taking of good land out of production by cities and industry, the most important destroyer of our productive capacity. (7) Desalting of brackish water, and even of sea water as a means of producing additional water for irrigation is now almost within economic possibility and may be within economic possibility if food should become really short. (8) The yields of human food by hydroponic methods, particularly if yeast, or algae, or both are used, are tremendous. (9) The enormous areas of the sea can produce much larger amounts of food materials than they now do, including, but by no means limited to, fish.

Twelve years ago, another Ohio agronomist, Dr. R. M. Salter, at that time head of the Bureau of Plant Industry of the United States Department of Agriculture and later the distinguished head of the Soil Conservation Service, estimated in a talk before the AAAS the possibilities of feeding the world, not merely the United States, in 1960. In a brief but careful review of the world's food supply, he estimated that we could take care of the prospective population by 1960 without any addition to our crop land, a prediction which, now that we are practically at 1960, is being overfulfilled. He then went on to estimate what could be done in the world as a whole, if we added the additional crop land which is available in the world as a whole, and carried out at least a considerable share of the additional means of food production which I have just outlined. He came up with an estimate which he put in figures and I am putting in words, that the world could support at least twice its present population, using what we knew in 1947. Obviously, Dr. Salter was assuming that the world will be a sane place, free of war, in which the maximum amount of food can be produced and distributed for human good. In practice I fear that this ideal will not be reached, but it is the only basis on which we can estimate.

I have no reason for disagreeing with Dr. Salter's estimates. They are as reasonable as can be made with so many imponderables.

Malthus, about 160 years ago, predicted that mankind would die of starvation. It has been fashionable to hold Malthus up to ridicule and tell how completely mistaken he was. Malthus certainly underestimated the ability of science to solve our food problems. If we were to estimate today the maximum population for which we could produce food, it is probable that we would similarly underestimate the potentialities of science.

But that is of comparatively small importance for two reasons. First, in many parts of the world today the pressure of population on food supply is of immediate and pressing urgency, and it is a desperate question whether these countries will have time or resources to apply what we and they knew. China, for example, an already overcrowded and underfed country, is at present experiencing a "great leap forward" which may, said the same Dr. Bear, be resulting in a population increase as high as 30 million a year!

Second, the basic fact is that despite the ridicule, Malthus was everlastingly right. How we must answer the question, "Can we have enough food to feed the world's population?" is entirely a matter of timing, whether you are talking about the near or the far view. If you ask whether we can have enough food for the next 25 years, the answer is obvious; we can. If you ask whether we can have enough food 100 years hence, the answer is not so obvious.

We have today a population base approaching 3 billion people. You can make any assumption you please as to the ability to mankind to produce food. We have only to carry the world's population increase a few more years to exceed any possible estimate of our food supply. At the *medium-level* projections of the United Nations study, we will reach 6 billion by the year 2000, which many of us will live to see. That would take all of Dr. Salter's estimated world food production potential.

Even a very small percent of increase on *our present population base* can produce more people than we can produce food for. To exceed our productive capacity merely requires that we continue the increase for another 10 years, for another 50 years, or another 100 years. But what is even 100 years to the length of time that man has been on this planet? And when you remember that any attempt to control population is a matter which goes contrary to our deepest instincts and will therefore probably require centuries of change before we really accomplish it, it is not a moment too soon to be thinking about means by which the percentage of increase in world population can be brought to zero. Zero increase is the only possible and logical answer to population problems. If there is any continuous increase whatever in population, it will, sooner or later, lead us to destruction. Our great hope is that our splendid present capacity for increase in production may give us time to learn to live like human beings instead of animals.

Ecologically, the numbers of any species of animal are mainly kept in balance by: (1) predators, (2) diseases, and (3) starvation. For man the only predator of any importance population-wise is man himself. We now have the capacity to wipe out the population of the earth, if some madman desires to do so, and that possibility is the only problem of more importance than the population problem. A basic reason for the present population explosion is our increased control of diseases. In the United States our control over diseases is now so great that an average of only three births per family will yield a population of 575 million by the 2050, a rate of growth we are now markedly exceeding. We can, therefore, leave disease out as an effective population control from here on. That leaves starvation as the only final control of human populations *except for the use of our intelligence*. We are tremendously fortunate that our food supplies are capable of being increased to the great extent that they can be. That capability gives us hope that in the time thus given us, we can learn to prove that intelligence can, in practice, lift us above the animal ecology.