

## MEMORANDUM TO THE PRESIDENT

**From:** Per Pinstруп-Andersen

**Subject:** Feeding the World in the New Millennium

### PROBLEM

One of every five people in the developing world is hungry. The new U.S. administration must put solutions to this catastrophe high on its agenda—and encourage other nations to do likewise—for six reasons:

- Hunger spawns illness, instability, violent conflict, and refugees—problems that are seldom contained within national borders and often spill into the United States;
- poor and hungry people do not make good trading partners;
- developing countries offer the most promising future market for U.S. goods and services;
- hunger fuels environmental degradation as desperate people try to eke out a living on ever more marginal land and migrate to urban slums in search of livelihoods;
- environmental degradation in developing countries affects the United States; and
- it is the morally right thing to do.

## BACKGROUND

### *Poverty and Hunger*

About 1.2 billion people in developing countries—almost five times the U.S. population—live on \$1 a day or less.<sup>1</sup> These people often cannot afford to buy all the food they need, although they may spend 50–70 percent of their incomes trying,<sup>2</sup> and many do not have access to land to produce food.

The number of hungry people has fallen since 1970, but 800 million people in developing countries (18 percent of the total) remain chronically undernourished.<sup>3</sup> Severe undernourishment is rare in industrialized countries, but many low-income people have difficulty meeting their food needs. The U.S. Department of Agriculture (USDA) considers 31 million people in the United States—about one in ten—“food insecure,” i.e., unable to regularly afford an adequate diet.<sup>4</sup> The rising economic tide of the 1990s has left many boats stuck on the bottom.

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The largest number of hungry people is in the Asia-Pacific region, especially South Asia (the Indian subcontinent). The other global hunger hot spot is sub-Saharan Africa, the only region in which the number of hungry people is expected to increase during the next 20 years. If the international community does not make significant policy changes, the developing world’s hungry population will only fall to 650 million by 2015, with hunger even more concentrated in Africa and South Asia. This is far short of the 1996 World Food Summit goal, agreed to by the United States, to reduce hunger by half by 2015.

Malnutrition among preschool children is of particular concern. Each year, it contributes to 5 million deaths of children less than 5 years old in the developing world—this is ten times the number of people that die from cancer annually in the United States. Even when they reach their fifth birthdays, malnourished children frequently suffer impaired physical and mental development. The silent scourge of malnutrition robs the human family of countless artists, scientists, community leaders, and productive workers. Currently, there are 150 million malnourished preschoolers in developing countries (27 percent of the total num-

ber of children less than five years old there). Malnourished mothers frequently have low-birthweight babies who are vulnerable to malnutrition, in effect passing hunger across generations.<sup>5</sup>

The International Food Policy Research Institute (IFPRI) projects that by 2020, without any changes in national and international policies, the number of developing-country malnourished preschoolers will still be 135 million (25 percent). The number will increase substantially in Africa, and 77 percent of all hungry preschoolers will live there and in South Asia.<sup>6</sup> Acute malnutrition is rare among U.S. children, but USDA estimates that 40 percent of the people in the United States who are food-insecure—12 million—are children. The reduction in global child malnutrition between 1990 and 2020 will not reach 25 percent, even though the World Summit for Children in 1990 pledged to halve preschooler malnutrition by 2000.<sup>7</sup>

Hunger is not just a problem of consuming too little food. Diets may also lack vitamins and minerals. Roughly 75 percent of people in the developing world consume too little iron; one billion suffer from anemia as a result. Iron-deficiency anemia is also a problem in wealthier countries, including the United States. It can lead to mothers dying during childbirth, newborn deaths, poor health and development among surviving children, and limited learning and work capacity. In some developing countries, iron-deficiency anemia reduces national income by as much as 1 percent annually. Inadequate vitamin A intake among developing-country children causes blindness, infections, and tens of thousands of deaths. Pregnant vitamin A-deficient women face increased risk of death in childbirth and mother-to-child HIV transmission.<sup>8</sup>

### *The Supply Side*

For the past 25 years, total global food production has consistently been more than adequate to provide everyone with minimum calorie requirements if food were distributed according to needs. However, in recent years, food production has been stagnant or declining in countries the United Nations has designated “low-income food deficit.” Poor weather, economic difficulties, and violent conflict create short- and even long-term food shortages affecting millions of people.

IFPRI estimates a gap between food production and demand in several parts of the world by 2020. Population growth, urbanization, changes in income levels, and associated changes in dietary preferences all affect demand. World population is projected to increase 25 percent to 7.5 billion in 2020. On average, 73 million people—equivalent to the population of the Philippines—will be added each year, virtually all in developing countries. Urban population in developing countries is expected to double. When people move to cities, they shift to foods that require less preparation time and to more meat, milk, fruit, and vegetables.

Average incomes in all developing regions are expected to increase through 2020, but income inequality is likely to persist within and between countries. Poverty is likely to remain entrenched in South Asia and Latin America and to increase considerably in Africa, where the average income per person will be less than \$1 a day. Many millions of impoverished people will be unable to afford the food they need even if it is available in the marketplace.

A 58 percent increase in global meat demand is forecasted between 1995 and 2020, with almost all of it coming from the developing world. This livestock revolution is already under way and will

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double developing countries' feedgrain demand during the next two decades. Farmers will have to produce 40 percent more cereals in 2020, with 80 percent of additional output coming from yield increases rather than farmland expansion. However, in both developed and developing countries, rates of

increase in cereal yields are slowing as low cereal prices have reduced fertilizer use, and levels of investment in agricultural research and technology are low. Poorly functioning markets and lack of infrastructure and credit also contribute. Africa is falling behind other regions.

IFPRI projects that developing countries' cereal production will not keep pace with demand through 2020. Net cereal imports will increase by 80 percent between 1995 and 2020. With a 34 percent increase projected in net cereal exports, the United States will continue to capture a large market share, providing about 60 percent of the developing world's net cereal imports. However, com-

petition will increase from Eastern Europe, the former Soviet Union, the European Union, and Australia.<sup>9</sup>

### *Constraints on Ending Hunger*

Several factors could significantly influence the food outlook during the next few decades:

**Trade Liberalization.** Many developing countries have liberalized food and agricultural trade since the 1980s. Developed countries have not taken reciprocal measures, maintaining barriers to high value commodities from developing countries, such as beef, sugar, peanuts, dairy products, and processed goods.

Developing countries must be encouraged to participate effectively in upcoming global agricultural trade negotiations, pursuing better access to industrialized countries' markets. However, without appropriate domestic economic and agricultural policies, developing countries in general and poor people in particular will not fully capture potential benefits from trade liberalization. The distribution of benefits will be determined largely by distribution of productive assets, such as land, water, and credit. In addition, many developing countries lack the infrastructure and the administrative and technical capacity to comply with global trade rules. The African share of world agricultural trade continues to decline rapidly. The effect of current trade agreements is likely to be adverse for most African countries.

Low-income countries must try to strengthen their bargaining position and pursue changes in both domestic policies and international trade arrangements:

- enact domestic policy reforms to remove biases against small-scale farmers and poor people while facilitating access to benefits from more open trade;
- seek elimination of industrial countries' export subsidies, taxes, and controls that exacerbate price fluctuations;

- provide technical assistance and financial support for poor countries' agriculture;
- create strong animal and plant health standards and technical support to help developing countries produce for developed-country markets; and
- convince donors to target adequate levels of food aid to poor groups in ways that do not displace domestic production.<sup>10</sup>

**Decreasing Aid.** Aid to agriculture and rural development shrunk by almost half between 1986 and 1997. The share of aid going to agriculture dropped from 25 to 14 percent. Aid to education has similarly declined, and overall development aid fell about 17 percent between 1992 and 1997.<sup>11</sup> Yet research has found that aid to developing-country agriculture not only is effective in promoting sustainable development and poverty alleviation, but it also leads to increased export opportunities for developed countries, including increased agricultural exports as agricultural growth spurs more general economic growth and demand for food products.<sup>12</sup> In addition to reversing the aid decline, donors, including the United States, must rethink their 20-year emphasis on reducing government's economic role, which has contributed to developing countries' public disinvestment in agriculture.<sup>13</sup>

In the post-cold war era, the United States has fallen to last place among donors in terms of aid as a percentage of gross national product (less than 0.1 percent). In absolute terms, U.S. aid has consistently ranked second to Japan's.<sup>14</sup>

In the late 1990s, the United States expanded food aid after substantial reductions mid-decade.<sup>15</sup> Fluctuations stemmed from domestic market conditions rather than developing-country needs, as the United States continues to tie food aid to U.S. farm products.

**Conflict, Refugees, and Food Security.** Since the end of the Cold War, internal conflicts have proliferated in developing and transition countries, particularly in Africa. Fourteen million refugees have fled these struggles, which have displaced another 20 million to 30 million people within their own countries.<sup>16</sup> Uprooted people are vulnerable to malnutrition and disease and need humanitarian assistance to survive. Postconflict construc-

tion takes years. Violent conflict not only causes hunger, but hunger often contributes to conflict, especially when resources are scarce and perceptions of economic injustice are widespread.<sup>17</sup>

**Soil fertility management.** Policies and investments are needed to eradicate hunger and protect natural resources, thereby breaking the vicious cycle of poverty, low productivity, and environmental degradation.

Low soil fertility and lack of access to affordable fertilizers, along with past and current failures to replenish soil nutrients in many countries, must be rectified through efficient use of organic and inorganic fertilizers and improved soil management. Reduced chemical fertilizer use is warranted where heavy application is harming the environment. Nevertheless, it is critical to expand fertilizer use where soil fertility is low and a large share of the population is hungry, especially in Africa. This will help boost production and reduce the serious land degradation that affects 20 percent of African farmland.<sup>18</sup>

**Pest management.** Preharvest losses to pests (insects, animals, weeds, and plant diseases) reduce the potential value of farm output by 40 percent; postharvest losses cost another 10 percent. In developing countries, losses greatly exceed agricultural aid received.<sup>19</sup> Developing countries' share of the global pesticide market is expected to increase significantly during the early 21st century. Insecticides now used in developing countries are often older and acutely toxic and often banned in developed countries except for export.

Until recently, developing-country governments and aid donors encouraged use of chemical pesticides. Now, consensus is emerging on the need for integrated pest management, emphasizing alternatives to synthetic chemicals except as a last resort. Alternatives include use of natural predators and biological pesticides as well as breeding pest-resistant crops.<sup>20</sup>

**Water.** Globally, water supplies are sufficient to meet demand through 2020. But water is poorly distributed across countries, within countries, and between seasons. Competition is increasing among uses. Developing countries are projected to increase water withdrawals 43 percent between 1995 and 2020, doubling domestic and industrial uses at the expense of agriculture.

Policy reforms can save water, improve use efficiency, and boost crop output per unit of water while reducing the risk of armed conflict between countries sharing surface or ground water sources. These reforms should include establishing secure water rights, decentralizing and privatizing water management, and setting conservation incentives.<sup>21</sup> (See Gleick memo.)

**Wild and marginal land.** Poor people in developing countries tend to depend on annual crops (which generally degrade soils more than perennial crops) and on common property lands (which generally suffer greater degradation than privately managed land). They often cannot afford to invest in land improvements. Degradation and lack of access to high-quality land frequently push poor people to clear forests and pastures for cultivation, often at the expense of wildlife habitat, contributing to further degradation. Policies should raise the value of forests and pastures, offer incentives for sound management, and help create nonfarm employment opportunities.<sup>22</sup>

### *Broad-Based Agricultural Development is Critical*

Despite rapid urbanization, poverty remains overwhelmingly rural in developing countries and is likely to remain so for decades. Hence, agriculture is key to

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reducing poverty. Even when rural people are not farmers or farm workers, they work in jobs closely related to agriculture, such as employment in enterprises producing processed food, tools, household goods, or services for agriculture.<sup>23</sup> Research has shown that for every new

dollar of farm income earned in developing countries, income in the economy as a whole rises by as much as \$2.60 as increasing farm demand generates employment, income, and growth economywide.<sup>24</sup> Agricultural growth also helps meet rising food demand and creates incentives for sustainable management of the natural resource base necessary for agriculture.

Sound public policies are essential to guarantee that agricultural and rural development is broad based, creating opportunities for small-scale farmers and other poor people. Markets have a critical role but by themselves cannot assure equity. Key public investments include

- assuring poor farmers access to yield-increasing crop varieties (including drought- and salt-tolerant and pest-resistant varieties), improved livestock, and other yield-increasing and environment-friendly technology;
- access to tools, fertilizer, pest management, and credit;
- extension services and technical assistance;
- improved rural infrastructure such as roads and effective markets;
- particular attention to the needs of women farmers, who grow much of the locally produced food in developing countries; and
- primary education, health care, clean water, safe sanitation, and good nutrition for all.

The policy atmosphere must promote poverty reduction, must not discriminate against agriculture, and should provide incentives for sound natural resource management, such as secure property rights for small-scale farmers. Policies and programs must engage low-income people as active participants, not passive recipients; development efforts seldom succeed unless affected people have a sense of ownership. Unfortunately, public investment in agriculture is on the decline in developing countries. On average, these countries devote 7.5 percent of government spending to agriculture (and the figure is even lower in many African countries).<sup>25</sup>

### *Agricultural Research Is Essential*

Public investment in agricultural research is crucial to food security. The private sector is unlikely to undertake research needed by small-scale farmers in developing countries—even though societal benefits may be extremely large—because it cannot expect sufficient gains to cover costs. Currently, low-income developing countries grossly underinvest in agricultural research: less than 0.5 percent of the value of agricultural production, compared with 2.0 percent in higher-income countries.<sup>26</sup>

Research should focus on productivity gains on small farms, emphasizing staple food crops and livestock. More research must be directed to appropriate technology for sustainable intensification of agriculture in resource-poor areas, where many poor people live. All appropriate scientific tools and better utilization of indigenous knowledge should be mobilized to help small-scale farmers in developing countries. These tools include not only new technologies that rely on external inputs, but also agroecology, which focuses on locally available farm labor and organic material as well as improved knowledge and farm management. In addition to the strengthening of national agricultural research in developing countries, international agricultural research, particularly the work by the Consultative Group on International Agricultural Research (CGIAR), should be supported.

Developed countries stand to gain from support for agricultural research for developing countries. For example, high-yielding varieties of wheat and rice bred by the Future Harvest centers for use in developing countries are now widely planted in the United States as well as in the developing world.<sup>27</sup>

### *The Role of Modern Agricultural Biotechnology*

Modern biotechnology<sup>28</sup> is not a silver bullet for ending hunger, but, used in conjunction with traditional and conventional agricultural research methods, it may be a powerful tool that should be made available to poor farmers and consumers. It has the potential to help enhance agricultural productivity in developing countries in ways that reduce hunger and poverty and promote sustainable natural resource use.

Current applications of molecular biology-based science to agriculture are oriented toward industrial country farmers and commercial farmers in a few developing countries. The United States alone cultivates more than 70 percent of genetically modified (GM) crops.<sup>29</sup>

Strong opposition to GM food in the European Union has resulted in severe restrictions on modern agricultural biotechnology. Opposition stems from perceived lack of consumer benefits, uncertainty about possible negative health and environmental effects, and widespread sentiment that a few large corporations will be the main beneficiaries. Consumers outnumber farmers by 20 to 1 in the European Union and spend only a tiny fraction of their income on food. U.S.

agriculture employs 2.6 percent of the workforce, and people spend an average of 12.0 percent of their income on food.<sup>30</sup> These numbers contrast sharply with comparable developing-country figures noted earlier.

Modern agricultural biotechnology offers many potential benefits to poor farmers and consumers in developing countries. It may help achieve the productivity gains needed to feed a growing global population, introduce resistance to pests without high-cost purchased inputs, heighten crops' tolerance to adverse weather and soil conditions, offer more nutritious foods, and enhance products' durability during harvesting or shipping. Bioengineered products may reduce reliance on pesticides, lowering crop protection costs and benefiting the environment and public health. By increasing yields and lowering unit production costs, biotechnology could help reduce food prices, greatly benefiting poor consumers.

Biotechnology-assisted research developed broader-leafed rice that denies weeds sunlight, increasing farm incomes in West Africa and reducing the time women farmers spend weeding, allowing more time for the child care essential for good nutrition. Development of cereal plants capable of capturing nitrogen from the air could contribute greatly to plant nutrition and soil health while helping small-scale farmers who cannot afford fertilizers. Biotechnology may offer cost-effective solutions to vitamin and mineral deficiencies, such as vitamin A- and iron-rich rice. By increasing productivity, agricultural biotechnology could help conserve wild and marginal land and biodiversity.

Public policy must guide research. In addition to increasing the public resources for agricultural research, including biotechnology research, the public sector can entice the private sector to develop technologies for poor people by offering to buy the exclusive rights and make technologies available to small-scale farmers.<sup>31</sup>

Before GM crops and foods are introduced, a country should have sound food safety and environmental regulations to assess the risks and opportunities involved. Health risks include the transfer of allergy-causing traits through genetic engineering. GM foods need to be tested for such transfers, and those with possible allergy risks should be labeled. Environmental risks requiring assessment

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include the spread of traits, such as herbicide resistance to unmodified plants (including weeds), the buildup of resistance among pests, and unintended harm to other species.

Recent mergers and acquisitions in the biotechnology industry may lead to reduced competition, monopoly or oligopoly profits, exploitation of small-scale farmers and consumers, and extraction of special favors from governments. Institutions to promote competition and an effective antitrust system must be established in developing countries.

The biggest risk is that modern agricultural biotechnology will bypass poor people in a kind of “scientific apartheid.”<sup>32</sup> Opportunities for reducing poverty, food insecurity, child malnutrition, and natural resource degradation will be missed, and the productivity gap between developing- and developed-country agriculture will widen for the benefit of no one.

## RECOMMENDATIONS

There is nothing inevitable about this rather pessimistic forecast regarding world hunger. It is possible to meet and even exceed the World Food Summit’s goal. If the new administration takes the appropriate actions, world hunger could decrease significantly by 2020. Achieving this will require concerted and committed action by governments, citizen groups, and the international community to empower poor people; mobilize new technological developments—including those in biotechnology—to benefit poor and hungry people in developing countries; invest in the factors essential for agricultural growth, including agricultural research and human resource development; and harness the political will to adopt sound antipoverty, food security, and natural-resource management policies. Failing to take these steps will mean continued low economic growth and rapidly increasing food insecurity and malnutrition in many low-income developing countries, environmental deterioration, forgone trading opportunities, widespread conflict, and an unstable world for all.

The United States should make the eradication of hunger the top priority of its relations with developing countries, as the Presidential Commission on World

Hunger recommended 20 years ago. Leadership of global cooperation to end hunger requires new policies:

**Domestic hunger.** The United States must address domestic hunger with employment policies to ensure adequate incomes for everyone to meet their needs, along with a nutrition safety net. This safety net should include full funding of the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC). Every dollar invested in WIC saves up to \$3.50 on Medicaid and special education. All schools should provide breakfast and lunch, with free meals for low-income children. Food stamp benefit levels should increase by 10 percent, and eligibility restrictions should be loosened.

**Increased aid.** The United States spends a smaller percentage of national income on development assistance than any other Organisation for Economic Development and Cooperation (OECD) country. As the world's wealthiest country, the United States can afford to increase aid to developing countries. It would cost an additional \$12 billion annually to bring the United States up to the industrialized-country average of 0.24 percent of GNP devoted to aid, a figure equivalent to half of U.S. annual sales of sporting goods and one-quarter of U.S. spending on tobacco products. The increase comes to \$44 per person per year. Such an expansion would leverage additional funds from other countries and accelerate progress toward ending hunger. Polls consistently show public support for aid aimed at reducing poverty and hunger.

**Need-based aid.** The United States should target aid resources based on need (i.e., to countries with high levels of poverty and hunger, particularly in South Asia and Africa). Aid should go to countries where government policies support poverty alleviation and sound natural resource management. Investment in building prosperity, peace, and stability in these countries promises the United States the potential for future commercial relationships. It is a win-win proposition.

**Improved aid.** Qualitative improvements in aid are needed, such as giving priority to human capital development and high-impact interventions. These include aid to broad-based agricultural and rural development and

national and international agricultural research (including increased support for CGIAR and international programs at Land Grant universities and colleges), clean water, safe sanitation, universal primary education, access to basic health care, access to credit, land reform, natural resource management, and democracy and popular participation in development. Resources should be redirected from higher income recipients and military aid to these priorities.

**Social development.** Research has shown that improvements in female education, food availability per person, health care, and women's social status all enhance child nutrition. Educating girls has an especially strong impact. Increased national incomes and democratic governance are also important.<sup>33</sup> Aid programs must include conflict prevention and resolution components. Postconflict assistance must focus on reconstruction and underlying social tensions.

**Food aid.** Food aid for humanitarian emergencies is essential. It should also be used to help ease transitions and dislocations caused by economic reforms and trade liberalization, maternal and child health activities, school meals and building, and restoring roads and irrigation systems through "food for work." The United States should continue to provide food aid through international organizations and nongovernmental organizations, allowing them to sell commodities to generate funds for high-priority development activities. The United States should significantly increase the use of food aid resources to procure food in recipient countries and other developing countries and for direct purchase of seeds, fertilizers, tools, and livestock for poor farmers.

**Biotechnology.** The United States should support agricultural biotechnology research oriented toward poor farmers and consumers in developing countries and assist developing countries in building capacity to enact and enforce food safety, biosafety, and competition-enhancing and antitrust regulations.

**Agricultural trade policy.** In light of the continuing importance of the United States as a supplier of food and agriculture products to the global market, domestic farm policies should promote productivity gains and sustainable natural-resource management to assure continued viability of the food and agri-

culture sector. Policies should focus on preserving and enhancing family farming operations because small- and medium-sized farms are at least as efficient as larger commercial operations. They tend to provide sound management of soil, water, and wildlife; and decentralized land ownership produces more equitable economic opportunity for rural communities and greater social capital.<sup>34</sup>

With respect to agricultural trade policy, maintaining current inequities in the global trading system does not develop long-term, mutually beneficial relationships between developing and developed countries. Allowing higher-value agricultural products from developing countries into U.S. markets without escalating tariffs and encouraging other industrialized countries to take similar steps could greatly benefit developing countries and enhance global public opinion regarding the trading system. In addition, the United States should end export subsidies (both explicit and hidden) and encourage other industrialized countries to eliminate policies that exacerbate global price fluctuations. The United States should also seek a global intellectual property rights framework that balances rights of seed companies and other plant breeders with farmers' rights to save and reuse seed.