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The Center for Food Safety works to protect human health and the environment by curbing the proliferation of harmful food production technologies and by promoting organic and other forms of sustainable agriculture. CFS engages in legal, scientific and grassroots initiatives to guide national and international policymaking on critical food safety issues.

Organic Foods Offer a Better Way to Farm and a Better Way to Eat — So Why Are They Under Siege?

Walk into any grocery store in America these days and you are likely to find a host of organic foods, from milk and eggs to arugula and oranges to beef and meatless sausage. Organics have become mainstream and big business, claiming two-thirds of U.S. consumers as customers. From 1994 to 1999 organic dairy sales increased five fold, and from 1999 to 2000, sales of organic fresh produce grew by 50 percent.[1] To help matters, organic foods and production methods finally gained a measure of distinction on October 21, 2002, when the national organic standards went into effect, putting an official government imprimatur on foods grown without dangerous chemicals, biotechnology, sewage sludge or inhumane treatment of livestock.

Organic farming methods challenge the status quo by offering an increasingly popular alternative to industrial agriculture and factory farming.

But these successes have not come without new challenges. The 2002 organic standards, and organic foods themselves, have increasingly come under attack from groups that oppose food regulations, from representatives of corporate food producers and from growers dependent on chemical inputs and/or genetically engineered crops. The U.S. Department of Agriculture (USDA), the federal agency charged with implementing and enforcing the new organic standards, is feared to be leaning toward the interests of corporate food producers in their efforts to weaken those standards.

Clearly, organic methods are a challenge to the status quo as they offer a viable, increasingly popular alternative to chemical-dependent agriculture and the factory farming of livestock. Defenders of technology-driven industrial agriculture address this threat by feeding the public a diet of misleading and inaccurate statements, claiming, among other things, that organic farming offers no real benefits and organic products are no better than industrially produced foods.

But the facts tell a much different story: numerous scientific studies demonstrate that sustainable organic farming is environmentally much sounder than intensive, chemical-dependent industrial agriculture. On issues ranging from soil and water contamination to global warming, organic farming is shown to be superior. When it comes to health and nutrition, documented and peer-reviewed surveys reveal that organic products contain fewer and lower concentrations of toxic residues than do industrially grown foods. Organic fruits and vegetables have also proven to be richer sources of crucial vitamins and minerals.

Unfortunately, the health, environmental, and social advantages of organic agriculture are not well publicized, leaving most Americans unaware of the full scope of benefits offered by organic food production.

Human Health

Pesticide Residues

The cornerstone of industrial agriculture can be summed up in one word—chemicals. Chemical fertilizers and pesticides pervade our industrial food production system in this country. Many of these chemicals make their way from fruit orchards and crop fields to our family's dinner table. Most consumers probably have no understanding of the vast quantities of pesticides we are exposed to through consuming industrial foods—a typical American can consume up to 70 pesticide residues a day through their diet.[2] This is a side dish few are expecting. Furthermore, many of these chemicals are neurotoxins and carcinogens, and are fat solu-

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ble, meaning they can accumulate in the body's fat cells for decades, eventually reaching dangerous levels.

Because U.S. organic standards strictly prohibit farmers from applying these toxic chemicals, organic produce clearly offers a safer alternative. Children whose diets consist primarily of organic foods are much less likely to suffer the effects of chronic pesticide exposure. A study in the peer-reviewed journal Environmental Health Perspectives found that preschool children fed a diet consisting primarily of organic foods had levels of metabolized organophosphate pesticide byproducts in their bodies that were six times lower than in children who had eaten diets of industrially grown foods.[3]

USDA studies have found that 73 percent of industrially grown foods contain at least one pesticide, and many contain multiple pesticides. Some samples are contaminated by dozens of different agricultural toxins.[4] In one instance, USDA found 46 different pesticide residues on sweet bell peppers, and 15 percent of the peppers sampled contained five or more residues. Peach samples contained 40 different pesticide residues, and 27 percent of the individual fruits contained five or more chemicals.[5]

Researchers have concluded that chronic, low-level exposure to organophosphate pesticide residues may hinder mental functioning, neurodevelopment, and physical growth in children.[6] Research shows that organic fruits and vegetables are much less likely to carry pesticide residues and almost never contain multiple residues. On the small percentage of organic produce samples that test positive for pesticide residues, the level of contamination is markedly lower than for conventional produce.[7]

Antibiotic-Resistant Bacteria

Antibiotic resistance is a growing problem in this country. What few people realize is that about 70 percent of all antibiotics made in the United States are given to livestock—that's 24.6 million pounds of antibiotics a year. Industrial livestock producers routinely administer antibiotics to cattle, swine, and poultry, even if the animals are not sick.[8] This massive application of antibiotics has resulted in drug-resistant bacteria making their way into the environment and into our food supply, reducing the effectiveness of antibiotics used to treat human afflictions.[9]

Organic farmers, on the other hand, only use antibiotics on animals that develop infections but do not respond to other treatment options. Even then, treated animals must be segregated from the rest of the group and their meat, milk, and eggs may not be sold as organic. In addition, because the National Organic Standards require organic farms to provide livestock with pasture grass and forage, as well as "access to the outdoors, shade, shelter, exercise areas, fresh air and direct sunlight," infections are much less prevalent than in industrial operations. By eliminating the routine use of veterinary antibiotics, organic farming reduces the evolution and spread of antibiotic-resistant organisms.

In a government survey of beef and poultry sold in the U.S., Food and Drug Administration (FDA) investigators found "fairly substantial amounts of resistance to a number of drugs."[10] Both the American Medical Association and the World Health Organization have strongly urged farmers to abandon the indiscriminate use of antibiotics in agriculture.[11]

Hormones

If you want to avoid growth hormones in your beef or dairy products, the only sure way to do it is to buy organic. Upwards of 80 percent of non-organic beef cattle raised in the U.S. each year are pumped full of growth hormones.[12] In addition to hormones used to increase milk production, chiefly, recombinant Bovine Growth Hormone, or rBGH, there are six hormones approved for use in beef cattle. Two of these hormones, estradiol and zeranol, are likely to have negative human health effects, including cancer and impacts on child development, when their residues are present in meat.[13] Concerns about these potential health impacts have left many scientists doubtful of the safety of hormone use in meat production.

The negative environmental impact of hormones entering waterways from livestock feedlots also is cause for alarm. Researchers have found that fish can exhibit significant effects from this pollution, e.g., females begin to exhibit male characteristics, and vice versa, in areas of high hormone concentrations.[14]

The good news is that the 2002 organic standards ban the use of hormones in all animals used in organic food production, thus eliminating the human health and environmental impacts from these substances.

Nutrition

Organic foods not only protect consumers from harmful pesticides and help reduce the creation of antibiotic-resistant bacteria, but they also provide greater nutritional value than industrially produced foods. A review of 41 published studies comparing organic and industrial fruits, vegetables, and grains concluded that organic foods contain higher levels of several key nutrients. On average, organic items had 27 percent more vitamin C, 21.1 percent more iron, and 29.3 percent more magnesium.[15]

A similar comparison of organically and conventionally produced foods published in the Journal of Agricultural and Food Chemistry shows significantly higher levels of cancer-fighting antioxidants in organic products than in their industrial counterparts.[16] This and other studies show that industrial practices also seem to remove natural nutrients from foods while using harsh chemicals to sterilize orchards and fields.[17]

Mad Cow Disease

Organically raised cattle are much less likely to be exposed to bovine spongiform encephalopathy (BSE), or mad cow disease, than cattle raised in factory farms. Animals bred for food under the 2002 organic standards cannot be fed material containing products from

rendered animals. In fact, their feed must be 100 percent organic itself. This requirement virtually eliminates the danger of organic beef containing BSE.

Mad cow disease can spread through cattle herds by feeding infected nervous system tissue to other animals. Beginning in the 1970s, the meat rendering industry began processing dead, dying, disabled, and diseased animals for use in livestock feed—and pet feed—as a way to increase the protein consumption of cattle, pigs, sheep, and poultry (cattle can get the disease by eating less than one gram of diseased meat and bone meal fed to them as a protein source).

Humans who eat contaminated beef products are at risk of contracting the human version of mad cow disease known as new variant Creutzfeld-Jakob disease (vCJD). The disease deteriorates the brain and is invariably fatal. There is no known cure, treatment or vaccine for these diseases.

Eating organic foods virtually eliminates the risk of being exposed to mad cow disease, growth hormones, antibiotics, pesticide residues and the multiple toxins present in sewage sludge fertilizers.

Despite the adoption of additional safeguards following the discovery of mad cow in the United States, the FDA still allows the risky practice of recycling animal offal into feed: ruminant animals (cattle, sheep, goats, deer) are fed to non-ruminants (pigs and poultry), and these non-ruminants are rendered and fed back to ruminants. Such practices are banned in Britain and Europe.

Sewage Sludge

Every time you flush your toilet or clean a paintbrush in your sink, you may be unwittingly contributing to the fertilizer used to grow the food in your pantry—unless your pantry is stocked with organic food. Independent research shows that sewage sludge contains numerous hazardous materials, including but not limited to, the toxic heavy metals lead and arsenic, PCBs, dioxins, and other hazardous organic materials.[18] Beginning in the early 1990s, millions of tons of potentially-toxic sewage sludge have been applied to millions of acres of America's farmland as food crop fertilizer, but not on organic farms. The practice has resulted in over three million dry tons of this hazardous material being spread on American soil and cropland each year, causing untold harm to public health, livestock, and the environment.[19]

Organic farming standards bar the use of municipal sewage sludge to fertilize organic crops. These standards are much tougher than the lax federal regulations governing the use of sludge in non-organic food production.

Despite the apparent danger of producing food using a vast, toxic mix of wastes collected from homes, chemical industries, hospitals and other sources, the EPA monitors only nine of the thousands of pathogens commonly found in sludge, and it almost never inspects the farms that use sludge fertilizer.

Health and Safety on the Farm

The methods used in organic agriculture protect farmers and farm workers from some of the gravest threats to their health and safety. Farming is the most dangerous occupation in the United States, and industrial agriculture's reliance on potent chemical toxins accounts for a significant portion of the risk. The EPA estimates that 10,000 to 20,000 physician-diagnosed pesticide illnesses and injuries occur among farm workers each year. These pesticide exposures result in a range of symptoms, including headaches, nausea, and fatigue, and may lead to more severe conditions such as cancer and neurological disorders.[20] A recent paper published by the National Cancer Institute found that male farmers who work with common synthetic pesticides have a 14 percent greater chance than the general population of developing prostate cancer.[21]

One recent report concludes, "Only elimination of hazardous pesticides and their replacement with safer, less toxic pest management tools is a sustainable solution to exposure to agricultural chemicals."[22] Of course, these ideals have served as cornerstones of organic farming for decades.

Environment

By design, organic methods drastically reduce or eliminate the severe environmental damage typically caused by industrial agriculture practices. The destructive practices of industrial farming degrade the very land and water needed to sustain farming for future generations. Rather than eliminating the natural environment for agriculture purposes, organic food production is built on a belief in the necessity of farming with the wild.

Biodiversity

The world is on the brink of an extinction crisis, with some scientists projecting that up to 20 percent of all plant and animal species could be gone within 30 years. The majority of these extinctions are being caused by habitat destruction, much of it due to agriculture.[23] In the United States, an analysis completed by the federal government in the mid 1990s found industrial farming to be a contributing factor in the plight of 42 percent of 631 threatened or endangered plants and animals.[24] Heavy pesticide use and the destruction of native habitats are prime culprits.

An example of this impact is the toll that industri-

al farming takes on bees and other beneficial insects needed for the pollination of crops. Wild bee populations have declined significantly in recent decades, due primarily to a loss of habitat and exposure to pesticides. In 1994, California almond growers had to import colonized honeybees to ensure that their trees were pollinated, a first for the industry.[25]

By contrast, organic farming fosters an environment in which pollinators thrive. A Princeton University study found more than twice as many bee species on organic farms as on industrial farms of the same size. The organic farms' total bee populations were also twice as large. The researchers determined that the organic farms in the study maintained a sufficient number of bees to fully pollinate their crops, while the industrial operations either brought in non-native bees to bolster pollination or suffered from incomplete pollination. "Continued degradation of the agro-natural landscape will destroy this 'free' service, but conservation and restoration of bee habitat are potentially viable economic alternatives for reducing dependence on managed honey bees," the researchers concluded.[26]

Organic farming practices increase biodiversity above and below the ground; preserve the health of surrounding bodies of water; and reduce soil degradation and erosion.

The Soil Association reports that when compared to their industrial counterparts, organic farms host 57 percent more plant and animal species, have five times as many wild plants in arable fields, and support 25 percent more birds at the field edge. Organic fields feature 1.6 times as many soil-dwelling invertebrates that serve as food for birds, three times as many non-pest butterflies in crop areas, and up to five times the number of beneficial spiders.[27]

Organic farming practices also preserve agricultural diversity by rejecting the massive monoculture fields typical of industrial operators. Many organic farmers control harmful pests and diseases by planting a wide variety of harvestable plants together, so that no one species is likely to be wiped out. Industrial monoculture fields, in contrast, make inviting targets for insect pests and are much more susceptible to catastrophic outbreaks of disease.

Water

Organic farming helps to preserve our dwindling fresh water supplies and the flora and fauna that rely on these natural resources by not using synthetic pesticides or fertilizers that contaminate rivers, streams, or groundwater. As noted above, industrial fertilizers are a witch's brew of chemicals, including cadmium, dioxin, zinc, arsenic, lead, mercury, nickel, nitrates, and phosphates, all of which can contaminate runoff water from fields or leach into the groundwater.[28] Nitrate levels in more than a quarter of U.S. drinking water wells exceed the federal safety standard of 10 parts per million (ppm).[29] Medical researchers found that women who regularly drank water with 2.46 ppm of nitrate were three times more likely to develop bladder cancer than women whose water contained a nitrate level of 0.36 ppm. The same researchers noted that nitrate concentrations exceed 5 ppm in 30 percent to 40 percent of Iowa's municipal water supplies, and most of the contamination was due to agricultural fertilizers.[30]

Surface water contamination is also a serious problem. Runoff from fields, orchards and other sources has elevated nitrogen levels in U.S. coastal ecosystems by 100 percent to 400 percent. Nitrate levels this high deplete oxygen levels in lakes, rivers, and streams to levels low enough to endanger fish and plant life.[31]

Pesticides contribute to water contamination as well. According to a report by the U.S. Geological Survey, 96 percent of freshwater fish, 100 percent of surface water samples, and 33 percent of groundwater samples contain at least trace amounts of pesticides.[32] The toxins have profoundly harmful effects on the wildlife that rely on contaminated bodies of water for habitat.

For example, each year, pesticides kill about 6 percent of the breeding population of bald eagles living along Virginia's James River.[33] Between 1977 and 1984, scientists attributed half of the fish kills off the coast of South Carolina to pesticide contamination.[34]

Soil

Organic farming enhances soil structure and reduces the rate of soil degradation through sustainable land management practices. By contrast, conventional farming practices have increased the rate at which soil is lost, allowing nearly 40 percent of the world's agricultural land to become seriously degraded.[35] Approximately 25 million acres of land are lost each year due to degradation, many of which are attributed to erosion at a loss of 1.9 billion tons.[36] Even though erosion drives up agricultural production costs by approximately 25 percent each year, conventional farming methods continue to deplete soil activity through the use of chemical inputs.[37]

Climate Change/Global Warming

The greatest environmental challenge of the current century will be limiting emissions of greenhouse gases responsible for global climate change. In the United States, agriculture produces 8 percent of the country's greenhouse gas emissions each year.[38] Given that a typical organic farm uses 50 percent less energy than its industrial counterpart, a large-scale switch to organic farming would cut agriculture's greenhouse gas emissions significantly.[39]

Nitrous oxide makes up the lion's share of agricultural greenhouse gas emissions and results from the use of man-made nitrogen fertilizers and the cultivation of nitrogen-rich soils. By rejecting industrial fertilizers and encouraging the widespread use of cover-crops that prevent greenhouse gas from escaping the soil, organic farming practices have the potential to significantly reduce nitrous oxide emissions.[40]

Additionally, scientists have discovered that organic soils absorb and retain more carbon than conventional soils. Much of the carbon held in organic soils would otherwise exist in the atmosphere as carbon dioxide, a potent greenhouse gas. No-till farming, a practice commonly used by some organic farmers, further reduces the carbon released back into the atmosphere when soil is turned over during tillage.[41]

Genetic Engineering

The genetic engineering of plants and animals is rapidly changing the ingredients of our nation's food supply. Already, this novel technology has invaded upwards of 70 percent of the processed foods in our grocery stores and our kitchen pantries—from soda to soup, crackers to condiments.[42] Because determining what products do and do not contain genetically engineered ingredients is extremely difficult, if not impossible, about the only way to be sure you are not consuming them is by eating organic or whole foods. Organic food standards do not allow the use of any genetically engineered crops in organic animal feed or organic foods.

Unsuspecting consumers by the tens of millions are being allowed to purchase and consume unlabeled genetically engineered foods, despite a finding by FDA scientists that these foods could pose serious risks (For a full discussion of these risks, see *Food Safety Review*, Vol. 1, Spring 2000). Currently, up to 45 percent of U.S. corn is genetically engineered, as is 85 percent of the soybean crop.[43] And new genetically engineered crops are being approved by federal agencies despite admissions that they will contaminate native and conventional plants and pose other significant new environmental threats (For a full description of these threats, see *Food Safety Review*, Vol. 3 Spring 2002).

Despite long-term and wide-ranging risks from agricultural biotechnology, Congress has yet to pass a single law intended to manage it responsibly; this despite the fact that our regulatory agencies have failed to adequately address the human health or environmental impacts of genetic engineering. On the federal level, eight agencies attempt to regulate biotechnology using 12 different statutes or laws that were written long before genetically engineered food, animals and insects became a reality.

Social & Economic Impacts

Family vs. Corporate Farms

Organic farming is not just better for the environment and consumers, it's better for communities as well. The

Industrial Agriculture: The Real E. coli Culprit

As the fortunes of organic agriculture have grown, so too have the number and severity of the attacks against it. The vast industrial food complex has rightfully concluded that organic food production is a threat to its decades-long dominance of our nation's food supply.

To drive its attacks, the industrial food business has relied on the erroneous findings and reporting of the likes of Dennis Avery of the Hudson Institute and John Stossel of ABC's 20/20.

In the late 1990s, the issue of E. coli contamination became an issue for organic farmers and the organic food industry when Avery published an error-plagued article in which he wrongly claimed that the U.S. Centers for Disease Control (CDC) had found that people who eat organic and "natural" foods are more likely than the rest of the population to be attacked by a deadly new strain of E. coli bacteria 0157:H7. In response to the article, the CDC directly refuted Avery's claims and stated that it had never conducted any studies comparing the risk of E. coli infection from eating conventionally grown or organic/natural foods.

In February 2000, on ABC's 20/20, Stossel made more incendiary and false claims when he stated that tests run by ABC found slightly more 0157:H7 contamination on organic lettuce than on conventional lettuce mix. Subsequent extensive research by CFS has found no documented cases of contamination of organic produce by E. coli 0157:H7. In fact, CFS found there is reason to believe that food produced through industrial agriculture actually has a much higher likelihood of becoming contaminated.

Stossel was eventually forced to retract his statements, explaining that ABC had not tested for E. coli 0157:H7 contamination, only for non-specified types of E. coli. An additional claim by Stossel, that in 1996, children had gotten sick from eating E. coli contaminated organic lettuce, turned out to be false as well; the lettuce producer had lost its organic certification *prior* to the time of contamination.

There are approximately 100 strains of E. coli, most of them beneficial. According to the CDC, there are no tolerance levels set for generic E. coli in produce because it **does not cause illness**.

Other claims by Avery have been similarly discredited, such as his contention that organic produce is more dangerous than conventionally grown produce because organic farmers use manure to fertilize their crops. In reality, both conventional and organic farmers use manure on their farms, but organic farmers must follow strict manure application guidelines not required of conventional farmers.

The CDC identifies meat contaminated during slaughter as the main source of human infection with E. coli. Contamination occurs when feces or contents of the intestines come into contact with edible meat. Research shows that E. coli 0157:H7 develops in the digestive tract of cattle fed mainly with starchy grain, like those raised on conventional factory farms. Cows fed mainly with hay generate less than one percent of the E. coli found in the feces of grain fed animals. In organic agriculture, ruminants like cattle and sheep are fed diets with a high proportion of grass, silage and hay.

ethic behind organic food production is much more likely to ensure the economic and social health of rural farming communities. Rather than forcing people to relinquish their food independence to corporate middlemen, localized organic farming tends to rebuild the lost connections between consumers and farmers.

While scientists have linked industrial agriculture to dramatic reductions in biodiversity, sociologists and economists have correlated corporate control of agriculture to the decline of rural communities and the disappearance of the family farm. Approximately 2 percent of farms account for over half of all crop sales. From 1978 to 1997, the number of corporate-owned farms in the United States increased by 67.2 percent, while the number of individual- and family-owned farms declined by 16.4 percent.[44] Between '97 and 2002, the trend has been toward similar consolidation.[45]

Organic farming offers an economically viable option for family farmers. Organic is the fastest growing sector in agriculture, with sales increasing from about $1 billion in 1990 to nearly $11 billion in 2003.[46] In addition, organic farmers receive prices for their fruits, vegetables, and grains ranging from 70 percent to 250 percent higher than their industrial counterparts.[47]

Industrial Economics

Industrial farming's reliance on chemicals and genetically engineered seeds has similarly proven costly to family farmers and farm communities. U.S. farmers spend over $8.5 billion on pesticides every year and apply more than 700 million pounds of the toxins to their fields. Yet, insect pests now cause crop losses of about 13 percent annually, up from 7 percent in 1945.[48] Meanwhile, commodity prices remain stagnant and depressed, near all-time lows. Farmers working at the industrial level receive 20 cents out of every food dollar spent, while some organic farmers selling at the local level can receive more than four times that amount.[49]

Biotechnology has further diminished farmers' economic freedom and tied them to technologies that generate more profits for corporations than rural communities. Farmers who purchase genetically engineered seeds must sign licensing agreements that prohibit them from saving seeds or selling them to other farmers—practices farmers have historically used to cut costs and boost profits. Biotech giant Monsanto—a leading producer of genetically engineered cotton, soybean, and corn seed—hires private detectives to investigate hundreds of farmers each year it suspects of saving seed and has filed 90 patent-infringement suits against farmers, according to CFS research.[50] This economic climate makes it tough for any but the largest and wealthiest operations to survive.

In contrast, organic farming promotes smaller-scale and local production. In fact, 87 percent of organic farmers operate single-family or family-cooperative farms. Organic crop yields compare favorably to those of conventional crops. For a large sampling of different crops, researchers found that organic yields were 95 percent of industrial yields, even though organic farmers were more likely than their conventional counterparts to grow varieties bred to emphasize quality and variety over high yields.[51]

Wariness around the world about U.S. industrial agriculture's rash embrace of genetically engineered seed technology has opened numerous export opportunities for organic farmers.[52] Profitable small family farms, the type encouraged by organic methods, can only benefit farming communities and help revive floundering rural economies.

Animal Welfare

Humane Treatment of Animals

Organic meat producers support the humane treatment of animals by providing for their basic behavioral and physical needs, many of which are denied when animals are reared in factory farm settings. Overcrowded in buildings, feedlots, and cages, factory farm animals suffer from this intense confinement, which causes increased levels of stress and disease and leads to the increased use of drugs and hormones to manage these effects.

Because the organic standards have strict requirements for the treatment of livestock, purchasing organic meat supports the welfare of animals. Among other things, the standards require that a "producer of an organic livestock operation must establish and maintain livestock living conditions which accommodate the health and natural behavior of animals, including: access to the outdoors, shade, exercise areas, fresh air, and direct sunlight suitable to the species, its stage of production, the climate, and the environment."[53]

Conclusion

The environmental, human health and animal welfare benefits of organic food production and products are numerous and growing in importance. Large-scale industrial agriculture—chemical- and technology-dependent, intensive, and inhumane—is rapidly becoming a food production system that society and the planet can no longer afford. Organic farming protects biodiversity and the environment, produces more healthful foods for consumers, and provides farmers with better economic opportunities and less hazardous working conditions.

Small-scale, localized food production that is humane, promotes social justice, and respects nature directly challenges the destructive and unsustainable industrial agriculture model. Organic farming allows us to recover a portion of our agrarian heritage and reclaim a measure of food independence usurped by massive agribusiness, chemical, and seed companies. Organic agriculture offers hope that eventually we may declare the industrial food production experiment a failure, and move on to an agricultural ideal that is mutually and consistently beneficial to farmers and farming communities, the environment, and consumers.

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