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Making safe, affordable and abundant food a global reality

Jeff Simmons
Elanco

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Making safe, affordable and abundant food a global reality

Highly efficient food production can help end world hunger, lower food costs, protect consumer rights and safeguard our natural resources. Achieving this requires protecting rights of the entire food chain to use new and existing technologies while sustaining consumer choice.

Jeff Simmons, Elanco

Introduction

A growing wave of food insecurity threatens more than 1 billion people around the world.[1] Global food costs are growing to dangerous levels, reaching record highs in January 2011. And these prices are expected to persist, according to the United Nations Food and Agriculture Organization (FAO).

We are at a crossroads. In the past two years, the global economic recession has decreased consumer buying power and increased food insecurity. In the next two years, tight supplies and rising food prices may stretch an already extended system to the breaking point. No longer is the number of hungry people steadily decreasing. In fact, the number of malnourished could grow staggeringly as the population reaches 9 billion by mid-century.

There are many reasons—ranging from poverty and politics to food waste, spoilage and infrastructure issues. But morally, it's unacceptable, and it doesn't have to continue. Unlike other global problems such as HIV / AIDS, a significant component of the solution to hunger already exists: the technology to efficiently produce an abundance of safe and affordable food. The need for action is urgent.

Yet standing in the way lies a myth: People don't want safe, modern and efficient technology used in food production. In fact, the research review conducted for this paper—including 28 independent surveys representing more than 97,000 people from 26 nations—exposes this myth (see Appendix, p. 12). Taken together, these data show that about 95 percent of people are either neutral or fully supportive of using technology to produce their food.

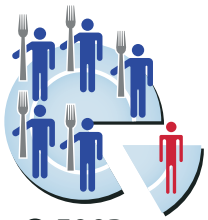
So it's time to end this debate. Acting upon the myth creates untold hardship: high food costs, an underserved population that doesn't have enough food, a reduction in basic consumer rights and an unsustainable depletion of natural resources.

Every minute we delay is another minute during which 12 children will die from hunger.[2] This is morally wrong, given that solutions exist. Facts support a more hopeful future where the consumer's right to choose and the farmer's right to use safe and efficient technologies are protected, and the moral imperative of feeding the world is at last achieved.

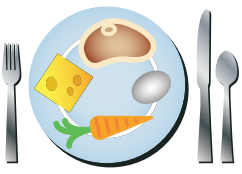
A Time for Action

Access to safe, proven, efficiency-enhancing technologies ensures:

THE THREE RIGHTS



❶ FOOD
a basic human right



❷ CHOICE
a consumer right



❸ SUSTAINABILITY
environmentally right

Executive Summary

- By 2050, we'll need 100 percent *more* food,[3,4] and according to the U.N. FAO, 70 percent of it must come from efficiency-enhancing technologies.[5]



- **Technology defined:**
  1. **Practices** – Doing it better
  2. **Products** – Using new, innovative tools and technologies
  3. **Genetics** – To enhance desired traits in plants and animals
- We must call a truce to the debate about the role of technology in the sustainable production of safe, affordable and abundant food if we are to protect the **Three Rights:**
  1. Ensuring the **human right** of all people around the world to have access to affordable food.
  2. Protecting all **consumers' rights** to spend their food budget on the widest variety of food choices.
  3. Creating a sustainable global food production system, which is **environmentally right.**
- **Key Point**

  The challenge of world hunger is complex and multifaceted. Allowing the entire food chain access to safe, efficiency-enhancing technologies is an essential component of a comprehensive solution to the challenge—both locally and globally. In addition, protecting the right to choose these technologies can make the dream of safe, affordable and abundant food a reality worldwide.

Food Safety and Science-Based Regulation

Only the world's authorized regulatory and governmental authorities should maintain oversight for food safety and the availability of food production technologies.

To be clear, this paper in no way advocates the use of any modern food production technologies that could have a negative impact on food safety.

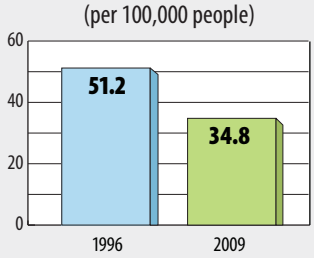
Maintaining the safety of the global food supply is an imperative for which there can be no room for compromise. This is a fundamental and unarguable premise of this paper.

Food producers worldwide play a critical role in this effort. However, only the world's authorized regulatory and governmental authorities — e.g., **the United States USDA and FDA, EMA, CODEX, WHO, China's Minister of Agriculture, Japan's Food Safety Commission and similar agencies**—should maintain ultimate authority for establishing, overseeing and enforcing strict food safety standards in all nations.

And data show their efforts are creating improvement. A recent report by the European Food Information Council shows food safety has improved significantly compared to 40 years ago, which EUFIC credits to "modern technological advancements" ranging from pasteurization to analytical tools that can measure undesirable substances in even minute amounts.[6]

In the United States, the FDA Foodborne Diseases Active Surveillance Network tracked a one-third decrease in the number of foodborne illnesses between 1996 and 2009—to 34.8 incidents per 100,000 residents.[7] To put it in context, 3,311 in 100,000 residents were involved in a motor vehicle crash in 2008.[8]

Incidence of Foodborne Illness in the U.S.[7]



As food safety technologies and practices continue to evolve, incidence rates for foodborne illnesses in the United States. have decreased by about one-third.

Most importantly, these regulating bodies must maintain control over the availability of technologies in the marketplace. Their authority cannot be superseded by unregulated groups that make unjustified claims not based in fact. Entertaining these claims can result in marketplace confusion, loss of consumer confidence, and the establishment of unvalidated standards that can jeopardize the well-being of consumers, farm animals and the environment.

Right #1: **FOOD** *A basic human right*

Safe, affordable food should be a right for all

My eyes were opened to the reality of hunger a few years ago when I met a man named Joaquin while I was living and working in Brazil. Like many Americans working overseas, I lived inside a bubble within a gated community, relying on the services of a driver and a guard. Yet, my bubble cracked when I established a friendship with my community's gate guard, Joaquin.

Late one night, a knock at my door pierced the silence. I opened it; there stood Joaquin with two young girls by his side. With a pained expression, he explained that his daughters had not eaten in over two days. He asked if I could help. Seeing my first hungry face up close made this personal, and at once I realized the need to help not just a fellow man but mankind.

Looking at Joaquin's daughters, I saw hungry faces for the first time. Emotionally, I found this unacceptable. I realized that in my role as a leader in food production, I could not hide from this truth; I had a personal responsibility to act. Solving the problem of hunger became more of a personal cause than an abstract "global issue."

Joaquin's story isn't unusual. His struggles are not unlike those of the 91,000 "food insecure" families who live in central Indiana, USA,[9] near where I now live with my family.

This is an area plagued by pockets of poverty and hunger about which Barry Rodriguez, director of World Next Door, blogs frequently. Barry often tells me about the people he meets who struggle with hunger and rely on school lunch programs and charitable organizations to piece together meals.

While the majority of residents in the industrialized world aren't faced with the threat of starvation, many deal with random bouts of food insecurity and spend significant effort searching for the next meal. Finding nutrition is the daily challenge for an increasing number of children in developed countries.

The problem of childhood poverty and hunger extends worldwide to:

- Two of every five children living in inner London[10]
- One in every eight children in France[11]
- One in every seven children in Japan[12]
- One in every five children in the United States[13]

In the developing world, hunger may well be the #1 health problem. Lack of food kills more people worldwide each year than war, AIDS, malaria and tuberculosis *combined.*[2,14] According to the World Food Programme, every hour, 720 children around the world die from a lack of food.[2]

Between 2008 and 2010, an estimated 18,250,000 people around the world died from malnutrition.[15] That's more than the total population

of Singapore, Chengdu (China), St. Petersburg (Russia) and Caracas (Venezuela) combined. And all these deaths happened since I wrote my first paper on hunger. That's like 60 jumbo jets falling out of the sky each and every day. We would not allow such a thing to continue. Will we allow this grave social injustice to continue, and potentially grow worse in the coming months and years? Will we continue to deny access to technology to many of the people who can help address this injustice, the world's food producers?

The high cost of high food costs

I believe every child born on this planet enters this world with two fundamental rights—the right to a hopeful future and the right to enough food. Yet in far too many countries, this latter right, if it exists, comes at a high price.

- Nearly 3 billion people—43 percent of the world's population—currently live on less than US$2 a day.[16]
- More than a third of the world's poorest live on less than US$1 a day,[17] or what many of us reading this paper might spend on a bottle of water.
- In the world's poorest countries, citizens can spend from half to as much as 80 percent of their income on food.[18]

Keeping food prices affordable is critical to creating greater access for those living on low incomes. Due to continual innovation in food production, we've been able to keep food prices amazingly low. Farm gate prices for corn, wheat, rice and milk actually cost 40 percent to 85 percent *less* than in 1960 based on inflation-adjusted prices. Meanwhile, oil prices, a key input in food production, have skyrocketed, costing 337 percent more than the inflation-adjusted price in 1960. For example, average milk price today is US$14.40 per hundredweight, but the 1960 average price adjusted for inflation would make milk US$22.89 today.[19]

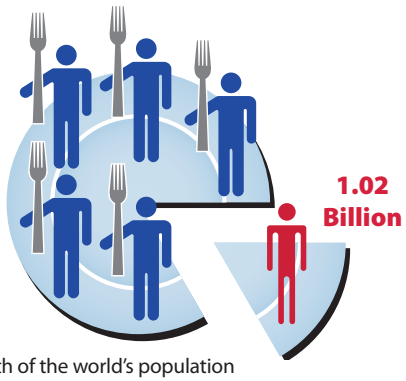
The Gates Foundation has identified agriculture as a key driver to affect improvements in health and reduction in poverty for developing world citizens. Bill Gates in his January 2011 annual letter noted, "When farmers increase their productivity, nutrition is improved and hunger and poverty are reduced. In countries like Rwanda, Ethiopia and Tanzania, investments in seeds, training, access to markets and innovative agricultural policy are making a real difference."[20]

Poverty is a complex issue, and solutions to the related challenges of poverty and politics will likely come over decades. Yet one thing can be done right now on more of a global level, and it boils down to *choice* and *technology*.

Food producers worldwide must be free to choose from a variety of safe and proven tools and methods for growing an abundance of food with maximum efficiency. And people everywhere must be free to choose from a variety of safe, wholesome and affordable foods for themselves and their families. The world still seeks a cure for AIDS, cancer and Alzheimer's disease. Hunger is a disease for which we already have a powerful weapon: technology.

Yet despite the imperative of making food affordable for the world's

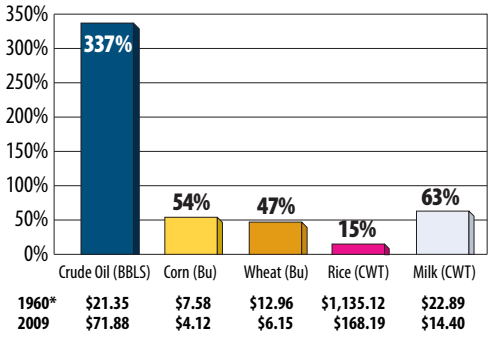
1 in 6 People in the World Goes Hungry in 2010[1]



One-sixth of the world's population doesn't get enough to eat each day.

Technology Keeps Food Cost Low

Inflation-Adjusted Cost Comparisons for Key Consumer Commodities (1960 to 2009)[19]

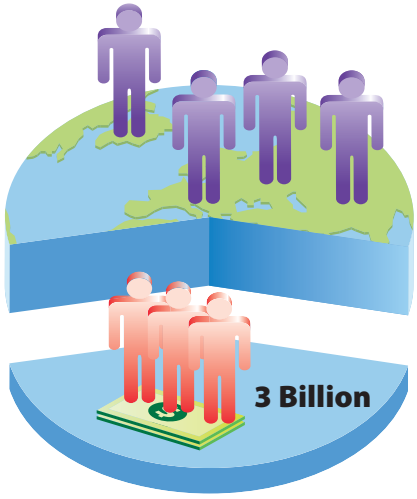


Over the past 50 years, inflation-adjusted prices for key food commodities have gone down. Compare that to the price of oil, which has more than tripled.

Note: Prices at well head and farm gate; all prices expressed in 2009 dollars; milk is Class III milk price

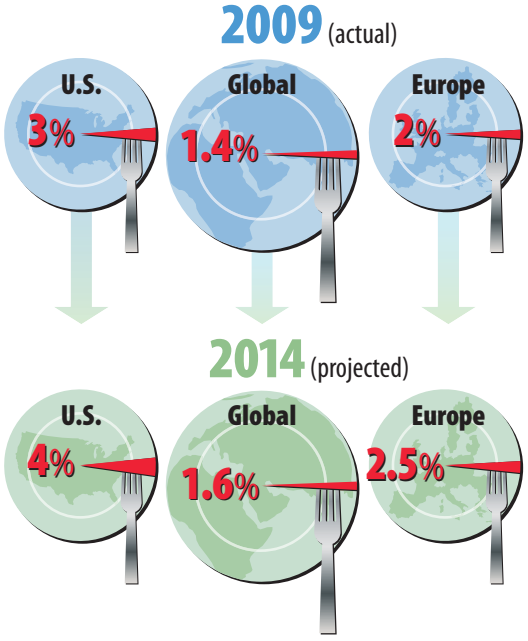
*Adjusted to 2009

43 percent of the World's Population Lives on Less Than US$2/Day[16]



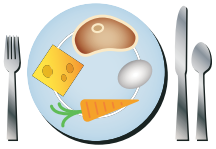
Affordable food can be a matter of life and death to the 3 billion people in the world who must live on less than US$2/day.

Percent of Organic Food Sales[22]



As a percentage of all food sales, organic foods grown without certain technologies represent less than 2 percent of worldwide sales. Even in industrialized regions such as Europe and the U.S., more than 97 percent of food budgets are spent on products grown using technology—a percentage projected to change very little by the year 2014.

poor, the myth persists that a majority of people are adamantly opposed to the use of cost-reducing food production technologies. The data, however, show otherwise.

Right #2: **CHOICE**  *A consumer right*

Myth informed: What do consumer attitude and behavior data show?

In preparation for writing this paper, a research project was undertaken to determine how and why people around the world make the food choices they make—and, more specifically, how they regard food-production technologies.

The International Consumer Attitudes Study (ICAS) was the responsibility of two agricultural economists who reviewed more than 70 reports and studies about consumer attitudes and behaviors from around the world (see Appendix, p. 12). From these, 27 met our criteria of using unaided questions or consumer spending data and were analyzed further, followed by a validation study by The Nielsen Company (see list on p. 12).

All told, these studies represent the opinions of more than 97,000 people in 26 countries.

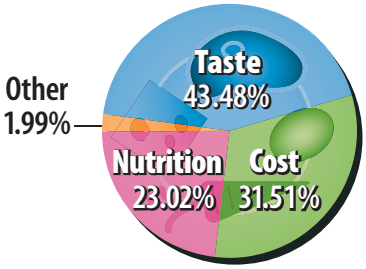
What did the ICAS project reveal?

- **95** percent of consumers are **Food Buyers.** They choose foods produced by modern agriculture and are either neutral about or supportive of using efficiency-enhancing technologies to grow food. In general, these buyers make purchases based on taste, cost and nutrition (in that order).

Some may wonder why food safety doesn't top the list. As I noted in my earlier paper, research shows that the "default" for most consumers is a belief that the foods they buy are safe to eat.[21] In general, it's only on the rare occasions when food recalls make headlines that consumers consider changing their buying behaviors—at least temporarily. The majority of food consumers do not make everyday purchase decisions based on food safety concerns or how they feel about policy and political issues such as animal rights.

Validation Study: Factors Influencing Food Purchase Decisions

The Nielsen Company, Oct. 2010[23]



According to a 2010 survey of 26,653 U.S. households, the most important factors in food purchasing decisions are taste, cost and nutrition.

- **4** percent are **Lifestyle Buyers** who purchase food based largely on lifestyle factors: ethnicity and vegetarianism, or support for organic, local and Fair Trade food suppliers, etc. For this group, money isn't a factor in their decision.

Research shows that the two groups tend to overlap in many areas, depending on personal tastes and preferences. In other words, these are not distinct market segments. In 2010, 75 percent of traditional food buyers in the United States also routinely bought organic foods,[24] even if they cost more. Barcode scanner data prove this, just as they show that no U.S. consumers purchase only organic products.[25] Similarly, many "locavores" regularly purchase products that can't be grown in their local climate, such as the bananas and coffee beans enjoyed by citizens in the EU.

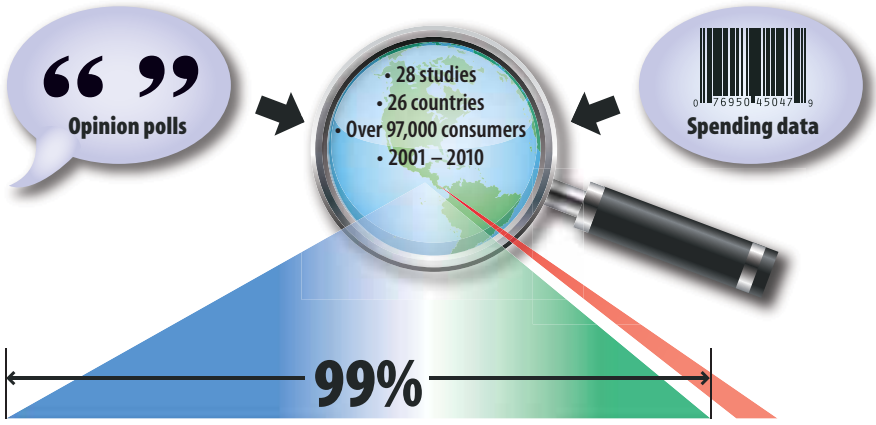
One trait both of these general groups have in common: They want to exercise their right to choose.

To further validate this, we commissioned The Nielsen Company to survey 26,653 U.S. households in October 2010 to determine the most important factor in food purchasing decisions.

Using a "tradeoff" scenario technique (see sidebar at right), the results showed **taste** was the most important factor (43.48 percent), followed by **cost** (31.51 percent), and **nutrition** (23.02 percent). The remaining 1.99 percent selected a variety of other choices.

Finally, data show global sales of foods grown without most forms of technology represent less than 2 percent of all sales globally—a percentage that's not projected to change significantly by 2014.[22]

The International Consumer Attitudes Study (ICAS)



Food Buyer: 95%
- Taste
- Cost
- Nutrition

Lifestyle Buyer: 4%
- Luxury/Gourmet
- Organic/Local
- Gardens

Fringe
- Food bans
- Restrictions
- Propositions

Analysis of 28 studies that looked at consumer attitudes and behaviors regarding food purchases shows that 99 percent of people choose to eat traditionally grown foods, lifestyle foods or both. Only a tiny percentage wants to eliminate food choices by banning specific agricultural technologies and/or methods.

The consumer's viewpoint: **Unaided research, "tradeoffs" and spending: keys to consumer insight**

by John Strak, *consumer market researcher and economist*



It can be dangerous to assume we know what consumers think. Yet much of the market research I see about their views on the use of technology in food production does just that. It makes faulty assumptions which, in turn, yield questionable results.

So how can we know what consumers really think? My answer—by conducting research that: 1) is unaided, 2) uses "tradeoff" scenarios and 3) is behavior based. (This is the type of research that was summarized in this paper.) Let me explain.

Unaided questions give no prompts on how to answer. Example: "What concerns do you have about the foods you and your family eat?" Contrast that with a question with prompting bias: "How concerned are you about X in your food?" Which better uncovers the consumers' true belief? My money is on the unaided question.

Furthermore, the 2010 Nielsen Company data cited in this paper effectively uses tradeoffs. It asks: "Which is the most important factor in your food purchase decisions: cost, taste, nutrition or some other factor?" By selecting just one, the consumer gives up or "trades off" the other three—a fair simulation of the real life decisions consumers make every day.



But do people actually "do" what they "say?" We shouldn't assume so. A useful way to resolve this "say vs. do" conflict is to examine behaviors. For instance, we could ask someone how much of their food spending goes to organics —or we could total up cash register receipts. One will give us opinions, the other facts.

This paper has done a worthy job of trying to present the consumers' unbiased views—a useful exercise. But perhaps it misses the more important point. Feeding the world responsibly and sustainably will require technology. Unfortunately, science, business and the media have not done a good job explaining the benefits of technologies to the shopper in the store. Consumers need robust information on what science offers to society. And the food chain needs unbiased views from consumers. This paper is a good starting point for more discussion. Let the tradeoffs begin!

Dr. Strak is Special Professor of Food Economics, The University of Nottingham, England.

An economist's viewpoint:

Why loss of choice means a loss for all

by Dennis DiPietre, *economist and author*

As an economist and educator, I know that simple examples can sometimes help explain complex economic theories. When it comes to consumer choice, here's an example of what happens when we let others make choices for us.

Recently, after opening her birthday gifts from my wife and me, my daughter thanked us and then asked her mother if she could exchange several of the items. Guessing someone's preferences, regardless of how well intentioned or how well you think you know them, can be difficult and costly. After the exchange, all of us were happier as my daughter more accurately matched her preferences and we gained the satisfaction of knowing our gift was appreciated.

Situations in exchange or even government policy where everybody is better off are sometimes hard to achieve, but when they occur, you can usually find freedom of choice at their root. The principal reason is that *nobody knows your preferences better than you do.*

Nowhere is it more critical to preserve choice than in food production and consumption. Notwithstanding the legitimate responsibility of government to ensure a safe food supply, it is increasingly popular for interest groups to use government to do such things as raise the cost of imported food, require that local governments purchase locally produced foods, or to restrict safe, proven technologies which can be used to improve the productivity of agriculture or lower the cost of food. Large city governments are even banning the purchase of legal foods by city dwellers and beginning to dictate, for instance, how much salt a chef can use in preparing a restaurant dish.

When a relatively small group is able to harness the power of public policy to impose their private preferences on everyone, they impose big costs on society. Economists call these costs **deadweight losses,** since everyone in the marketplace, buyer and seller, is worse off. Buyers can't find attributes they want, and sellers pay higher supply-chain costs and experience reduced sales. It's like deliberately choosing a gift for someone about whom you know nothing and then restricting or preventing their ability to exchange it. That's not a nice thing to do—and it raises everyone's cost.

Dr. DiPietre received his Ph.D. from Iowa State University (USA). Through his firm, KnowledgeVentures, LLC, he consults with leading food production companies around the world.

View from the fringe

Imagine, for instance, if a small fringe group began advocating for legislation to ban all kosher foods. Consumers would be enraged by having their right to choose taken away.

Yet a fringe group (1.66 percent of U.S. consumers, according to research commissioned from The Nielsen Company)[23] seems to believe that the majority of consumers are naïve.

This group participates in protests, picketing and rallies to "protect" consumers from modern food-production "threats." Although these groups are sometimes little more than a few like-minded people skilled at gaining access to the media, they can be effective at influencing local, regional and even national media—and legislation. The results of their efforts, including bans on safe, efficient food production technologies, tend to have far-reaching and often negative consequences, no matter how unintended.

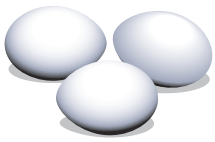
Their rationales for these limits and bans are typically driven by emotion and fear rather than facts, and their actions ignore the right of the hungry to be fed. Instead of helping others, then, the "fringe" are condemning more of the world's poor and hungry to death.

Thus, where it makes sense, global food chain leaders and organizations must join together to speak out for high food safety standards but against senseless bans on lifesaving, efficiency-enhancing technology—bans that raise food costs, decrease food production and increase the depletion of natural resources.

As ICAS and other research shows, 99 percent of consumers want taste, cost, nutrition and some lifestyle choices. Consumers want the right to make their own food-buying choices rather than having those choices made for them.

This fringe group, as well, should have a choice. If they have credible scientific data that prove their claims, they should choose to share that information not with the media and online but with the appropriate regulatory bodies authorized to examine and act upon that data. We appreciate consumers asking the tough questions, but when choice is removed without regulatory, science-based review, we all lose.

A no-win proposition: What happens when we take away consumer choice?



When activists from the fringe are successful at lobbying legislators to enact new laws or change existing laws governing food production, food safety, choice, affordability and access can all be compromised. Examples of this abound. Consider California, USA. Proposition 2, passed in California in 2008, was intended to create "humane standards for farm animals" by dictating, in part, how egg producers house their hens.

Analysis done by agricultural researchers at the University of California Agricultural Issues Center[26] led them to conclude that:

- Proposition 2 would increase egg production costs in California by 20 percent.

- This loss of competitiveness among California's egg producers could result in the complete elimination of that state's egg production industry by 2015, when the law takes effect.
- If laws such as Proposition 2 were to become national standards, American consumers should expect egg prices to rise by at least 25 percent, not to mention the price impact on the many foods which include eggs as an ingredient.

"Golden Rice": hope for millions tarnished



Created by Swiss researchers in 1999, what came to be called "Golden Rice" is a modified strain of rice that contains beta-carotene, which the body converts into vitamin A. Vitamin A deficiency is a serious public health problem around the world, contributing to as many as 3 million preventable deaths among children each year.[27]

The inventors of "Golden Rice" were not concerned with profit and instead considered theirs a purely humanitarian endeavor. They were prepared to provide free license for farmers in developing nations to plant, grow, sell and replant the grain at will. Their only obstacle? "Golden Rice" is a genetically modified organism (GMO). It's been banned in the EU and, as a result, in Africa, where it could save countless lives—this despite the fact that 57 countries have already approved the planting or import of biotech crops or products derived from them.[28] In fact, the developers of this lifesaving technology estimate that, since 2002, more than a quarter million deaths due to hunger and starvation could have been averted if "Golden Rice" had been approved for use.[29]



A change of heart for the EU?

The tide in Europe, after many years, appears to be turning away from the extreme viewpoint and toward a more fact-based approach to protecting consumer rights and capitalizing on the capacity of technology to help end hunger and starvation.

Paolo De Castro, chairman of the European Parliament's Committee on Agriculture and Rural Development, concurs. "We owe much to our farmers, and they deserve the right to choose to use the technologies that will help them maximize their productivity—recognizing that these technologies must be proven safe and effective," he writes. "It is globally acknowledged that the key question today is how to provide food security in a sustainable way at reasonable market prices.[30] And we need to add: within a political framework broadly accepted by our citizens. Farmers in the EU must be allowed to choose the tools they need to thrive, and our citizens must be free to select from the widest variety of food choices made possible by our modern food production enterprises."[31]

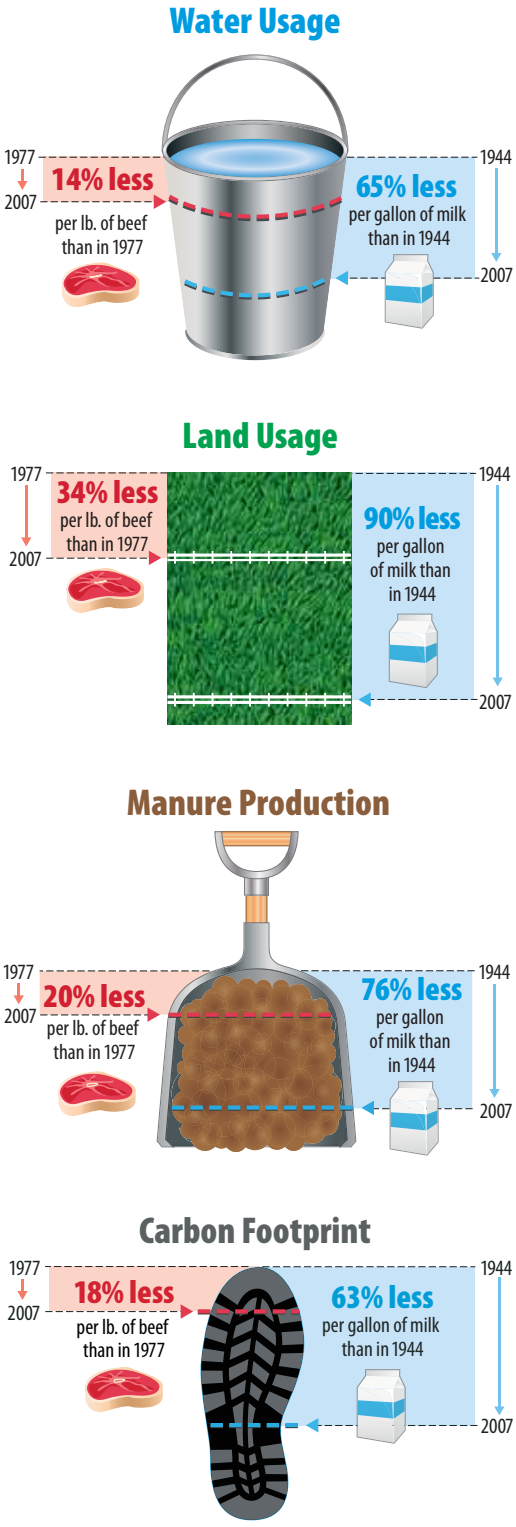
With leadership from those like Paolo De Castro and broad consumer support, it's time to put the myth to rest and shift the dialogue toward addressing a much more important question: *how can we sustainably feed our growing world?*

"FARMERS IN THE EU MUST BE ALLOWED TO CHOOSE THE TOOLS THEY NEED TO THRIVE, AND OUR CITIZENS MUST BE FREE TO SELECT FROM THE WIDEST VARIETY OF FOOD CHOICES MADE POSSIBLE BY OUR MODERN FOOD PRODUCTION ENTERPRISES."

– Paolo De Castro

Chairman of the European Parliament's Committee on Agriculture and Rural Development

Efficiency-enhancing technologies can greatly reduce resource usage on the farm[32,33]



Data collected and analyzed over decades prove that advances in agricultural efficiency have far-reaching, positive effects on the environment.

Right #3: **SUSTAINABILITY:** *Environmentally right*

Technology yields sustainability: the environmentally right solution

Finally, the responsibility of providing an abundant, affordable food supply with a broad variety of consumer choice must be delivered while protecting the very resources—the land, water and air—that sustain us.

The facts are compelling and leave little room for argument. Production technologies are enabling farmers to grow more food with greater efficiency, allowing them to feed more people while consuming fewer natural resources and generating less animal waste. Modern, efficient food production is environmentally sustainable.

The data speak for themselves. For example, since 1944, annual production of milk per cow has quadrupled in the United States,[32] which means we need far fewer cows to meet the demand for milk. Consequently:

- Modern production of every gallon of milk requires 65 percent less water and 90 percent less land than it did in 1944.
- 76 percent less manure is being produced for each gallon of milk sold.
- The "carbon footprint" for a gallon of milk in 2007 was 63 percent lower than it was in 1944.[32]

The story is very much the same for every pound of beef found in the meat case.

- We need nearly a third fewer cattle today to meet demand than we did in 1977.
- Each pound of beef produced in the United States today requires 14 percent less water and 34 percent less land, and beef production generates 20 percent less manure than in 1977.
- The "carbon footprint" for each pound of beef we buy today is 18 percent lower than it was a generation ago.[33]

We've seen similar gains in grain production. In 1961, an acre of wheat globally fed about two people. Today we can feed nearly six people from that same acre. Similarly, global data show that an acre of rice fed four in 1961 and doubled to more than eight people in 2009.[34]

Yet we have to continue to improve. To ensure our growing global population has sufficient food, we're going to need to grow food with maximum efficiency and with as little impact on the environment as possible. As Dr. Jason Clay from the World Wildlife Foundation notes, "to feed 9 billion people and maintain the planet, we must freeze the footprint of food. If we exceed the carrying capacity of the planet, we are taking away the very resource base that will be needed by our children and our grandchildren.[35] We must *use* less to produce more *from* less."[36]

The impact of technology

One telling way to evaluate the impact of technology is to consider agriculture in Brazil and the U.K.

Historically, the U.K. has been a significant food producer and provider to Europe. In the past decades, however, EU policies have limited U.K. farmers'



access to technologies—and legislation and a vocal minority have impacted practices. While there were multiple factors at play over this time, the U.K. lost 60,000 farmers and farm workers (between 1998 – 2001)[37] and by 2007, U.K. meat imports were 389 percent higher than exports.[38] In addition, farm incomes declined 71 percent between 1995 – 2001[37] and were negative in seven of 11 years between 1998 – 2009.[39]

These broader political decisions have contributed to the undermining of EU farm sector competitiveness. Ultimately, a country that was once responsible for feeding other countries has seen a dramatic shift in trade balance and now relies heavily on imports from other, lower-cost producers like Brazil.



In less than a generation, Brazil has been transformed from food importer to one of the world's most efficient producers—and largest food exporters. Between 1996 and 2006, the value of Brazil's total crop production increased by 365 percent.[40] Beef exports increased tenfold over one decade, and Brazil is now the world's largest exporter of beef, poultry and sugar cane.[40] And much of this has been accomplished without significant government subsidies and without converting lands covered by the Amazon rain forests.

The secret to Brazil's remarkable turnaround? In large part, it was a political climate that encouraged protection of Brazil's environment while at the same time expanding choices in agricultural technology—powered by the Empresa Brasileira de Pesquisa Agropecuária (Brazilian Agricultural Research Corporation), or Embrapa for short.

By developing technologies ranging from new seed genetics to new breeds of cattle, Embrapa has harnessed advances in research and technology to address some of the world's most daunting food production challenges. And they've done it in a manner that not only broadens the technology choices available to food producers but also helps protect and preserve Brazil's environment.

Marcus Vinicius Pratini de Moraes, former State Minister for Agriculture, Livestock and Food Supply, former chairman of the Brazilian Beef Export Industries Association, member of the board of JBS S.A. and COSAN, attributes Brazil's agricultural transformation to five key factors:

1. **Sun**
2. **Soil**
3. **Entrepreneurial leadership**
4. **Technology**
5. **Pro-agriculture policies**

"We understand that biotechnology has much to contribute to agriculture and humanity," says Pratini.

Brazil can serve as a model for other countries currently struggling with food insecurity. By harnessing the advances of science, the country has gained much-needed monies from food exports and also provided more affordable and healthy foods to its population, transforming a nation's struggles into an economic and humanitarian triumph.

"That's why I fully support scientific development," Pratini says. "Because it can improve the quality of life for all humankind by providing a safe solution to achieving food security."[41]

Challenges to the Three Rights

This is a complex issue, and it often generates three common challenges.

1. **"We don't need technology to feed the world—we need solutions to political issues and poverty."**
   In fact, we need all three. But technology is a solution that exists today that can deliver immediate results. As Bill Gates stated, "When farmers increase their productivity, nutrition is improved and hunger and poverty are reduced."[20] And it played out in the Green Revolution too, according to experts who point to Norman Borlaug's work on the breeding of high-yield grains, which is credited for saving millions from starvation in the 20th century.[42] Technology is not the sole solution, but it's one solution that can be deployed today to impact the moral, economic and environmental challenges we face.

2. **"If food consumers knew the facts, they wouldn't choose foods produced using certain technologies."**
   Those who have credible data that call into question the safety of any new or current food production technologies should, by all means, share them with the appropriate regulatory bodies. If, however, they have only opinions, they owe it to consumers to acknowledge that this is the case. The fringe needs to understand that food security may not be an issue for them, but their actions could take the right of choice away from hungry — even starving people — around the world. This is morally wrong.

   Further, the ICAS study for this paper showed 99 percent of global consumers make purchase decisions based on taste, cost, nutrition or some lifestyle factor.

3. **"Food production technologies harm our environment."**
   Modern food production methods actually reduce the use of precious natural resources such as land and water—all while creating even less waste.[32,33,34] Efficiency is the only way to optimize our scarce resources and meet tomorrow's needs for a doubling in food production.

Conclusions and final thoughts

The need to move boldly forward to address world hunger has never been more pressing. Grain stocks are at startlingly low levels. Food prices are at record highs and expected to grow. Population is sprinting toward 9 billion. We have a unique window of opportunity: A spotlight has been brought to the issue. The need is urgent!

The myth has been exposed. To make safe, affordable and abundant food a reality, we must focus on the three fundamental rights that come from access to technology:

1. ***Food* – a basic human right** Withholding safe, proven innovations that make food production more efficient is inhumane and should be considered morally unacceptable.
2. ***Choice* – a consumer right** All consumers should have the right to spend their food budget as they see fit. Those who need affordable food choices should find them readily available. Affluent consumers should have lifestyle options.
3. ***Sustainability* – environmentally right** Continuing to safeguard our natural resources while endeavoring to feed 9+ billion people by 2050 will require levels of efficient food production heretofore unachieved. Technology has helped us extend human life expectancy, virtually eliminate smallpox from the planet and send men to the moon. Likewise, safe, proven agri-food technologies can help the world's farmers produce more with less.



A time for action—What can you do?

- **Make it personal** Join me in making the end of global hunger a personal mission. Step out of your "bubble." See hunger up close and you will become an activist for safe, abundant, affordable food. Can there be a more important moral issue to address? It's time for all of us to make food a right for everyone, everywhere. Make it *your* issue.
- **Engage** Most importantly to the readers of this paper: Engage with the key food chain influencers you know. The "napkin speech" is quite simple: *Safe, affordable, abundant food = Technology (50-100-70) + Choice (95-4).* Solutions to the challenges of eliminating world hunger and maximizing consumer choice exist. Only by working together can we successfully implement those solutions. To get engaged today, start by visiting www.plentytothinkabout.org.
- **Support** Finally, stand at the ready to support the 99 percent of the world's citizens who want unconstrained choice and a supply of safe, affordable and wholesome food—as well as to support the regulatory bodies that make it possible to produce that food. When you become aware of fringe groups who seek to eliminate choices, ban practices or even eliminate animal protein from our diets, respectfully ask them to prove their assertions using sound scientific, economic and environmental data, and share it with regulatory bodies.

  Morally, scientifically, economically, environmentally and socially, the data support the use of technology.

  All these facts align to support a position on which we can all agree: committing ourselves to ensuring that a global supply of safe, affordable and abundant food can become a reality in our lifetime.

About the Author

Jeff Simmons and his wife, Annette, live in Carmel, Indiana with their six children. Jeff is an active advocate of food technology and its role in providing more affordable, efficient and sustainable production of meat, dairy and eggs. In 2009, he published a white paper on food technology in the 21st century, "Food Economics and Consumer Choice: Why agriculture needs technology to help meet a growing demand for safe, nutritious and affordable food." He serves as President of Elanco, the animal health division of Eli Lilly and Company (NYSE: LLY), where the company's vision is "food and companionship enriching lives." Elanco develops innovative, safe technologies to make healthier, more efficient production animals. The company is working on a humanitarian effort to help end childhood hunger in its home city of Indianapolis and bring 100,000 developing-world families out of hunger through a unique partnership with Heifer International®. Jeff received a bachelor's degree in Agricultural Economics and Marketing from Cornell University in 1989. He stays connected to key aspects of the food chain through his family's farm in New York, global food chain relationships, speaking engagements and the continual shaping of policy and approaches to enable safe, abundant, affordable food.

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Dr. DiPietre received a Ph.D. with Research Excellence from Iowa State University (USA) in 1986. He consults internationally with leading food production companies. A published journal article co-authored by Dr. DiPietre was included in the Core Historical Literature of Agriculture at Cornell University, a compendium of key contributions to agricultural science and literature over the last 200 years.

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Erickson consulted with Elanco as part of the ICAS team while completing his Master's of Science in Agricultural Economics at Purdue University during the summer of 2010. Prior to graduate school, he worked at the U.S. Department of Agriculture. Currently, he works at the American Farm Bureau Federation® as an economist.

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Dr. John Strak is Special Professor of Food Economics, The University of Nottingham, England. An academic and consultant, his most recent assignment was with the Round Table for Responsible Soy, directing their outreach program in Europe. Former roles have included serving as Managing Director of an award-winning beef and fine foods company in Scotland, which is part of HRH The Prince of Wales' North Highland Initiative, and Chief Economist at the International Wool Secretariat. Dr. Strak is currently Editor of Whole Hog, the global pig industry newsletter (www.porkinfo. com). He also heads FoodEast (www.foodeast.com), an information and networking service for food and farming companies in the east of England.

Barry Rodriguez

Rodriguez is the director of World Next Door, a not-for-profit organization based in Indianapolis, Ind., whose stated mission is to use "thought-provoking and heartbreaking journalism to change ordinary people into wild-eyed revolutionaries and to unleash them on local and global issues of social injustice." Rodriguez is a writer, photographer and teacher with a passion for social justice and travel. Through World Next Door, he hopes to help others explore the world and to "discover the hope that lies just around the corner."

The Nielsen Company

In October 2010, the ICAS team commissioned The Nielsen Company to conduct an online survey of 42,169 U.S. households, to which 26,653 households responded. Of these respondents, more than 98 percent reported that taste, cost and nutrition were their top three considerations when making food purchases. In addition, 1.66 percent reported that they had either attended a public rally/march or protested/picketed a farm, ranch, restaurant or grocery store in an attempt to change the way in which food is produced.

Summary of studies and key data from the International Consumer Attitudes Study (ICAS)

ICAS was a review of consumer attitudes and behaviors supervised by economist Matt Erickson, who along with Dennis DiPietre identified and analyzed more than 70 research sources, including 27 consumer surveys that met the following three key criteria for inclusion in the evaluation:

1. To minimize bias, **unaided questions** were a key selection priority. These are open-ended questions asking consumers to provide their own answers without having a list of choices from which to select an answer.
2. To contrast *reported* attitudes with actual behaviors, **consumer spending data** was included in the analysis.
3. **Unsolicited "consumer attitude data"** generated by groups with an obvious agenda (e.g., letter-writing campaigns, pro or con, about issues related to food production) **were excluded** from this analysis. For the sake of objectivity, ICAS consumer attitudinal data was limited to surveys asked proactively by qualified researchers.

After completing their analysis of these 27 studies, the ICAS team commissioned The Nielsen Company to conduct a confirmatory survey of more than 26,000 U.S. consumers that is projectable to the entire U.S. population. This confirmatory study showed that 98 percent of consumers consider taste (43.48 percent), cost (31.51 percent) and nutrition (23.02 percent) as the top three factors when making food purchase decisions. A separate part of the study indicated that 1.66 percent of consumers have marched / rallied, protested or picketed a farm, ranch, restaurant or grocery store in an attempt to change food production methods.

ICAS was not intended to be a meta-analysis of all consumer research. No common measure of effect size was identified, nor was a weighted average derived from analysis of the data.

Rather, the purpose of ICAS was to represent an objective and global sample of consumer opinions and behaviors about food from 2001 - 2010.

Study/Report	Year	Total # of consumers surveyed	Data about majority viewpoints	Data about minority viewpoints
1. *Public Opinion Report: The U.S. Consumer Relationship with Food and Expectations from Farm to Fork*[43]	2010	1,000	**92%** want food companies to offer more healthy food choices	**8%** are uninterested in more healthy food choices
2. *Food Biotechnology: Consumer Perceptions of Food Biotechnology in Asia*[44]	2008	1,007	**98%** (average) reported no concern about genetically modified foods	**2%** (average) reported a concern about genetically modified foods
3. *Eurobarometer 55.2, Research Directorate – Gen., European Commission, Europeans, Science and Technology*[45]	2001	16,029	**94.6%** want the right to choose whether to buy GMOs	**5.2%** don't know or do not want the right to choose whether to buy GMOs
4. *2010 IFIC Consumer Perceptions of Food Technology Survey*[46]	2010	750	**98%** report no concern about biotechnology as a food safety issue	**2%** report a concern about biotechnology as a food safety issue
5. Food Marketing Institute Research Department: *2009 U.S. Grocery Shopper*[47]	2009	2,040	**90%** of Americans are concerned about the nutritional content of foods they eat	**11%** of Americans are not too concerned or not concerned at all about the nutritional content of foods they eat
6. USDA Report: *Factors Affecting International Demand and Trade in Organic Food Products*[48]	2001	N/A	**97%** of global food sales are for non-organic foods	**3%** of global food sales are for organic foods
7. Just Food by J. McWilliams. *Organic Panic: Discovering Agriculture's Golden Mean*[49]	2009	N/A	**98%** of the world's citizens eat food grown conventionally	**2%** of the world's citizens eat only organically grown foods
8. Harris Poll #97[50]	2007	2,392	**93%** do not purchase organic foods all/most of the time	**7%** purchase organic foods all/most of the time
9. Datamonitor: *Global Food and Organic Retail for Years 2009 and 2014*[22]	2009	N/A	**98.5%** of global food sales are for non-organic foods	**1.5%** of global food sales are for organic foods
10. U.K. Food Standards Agency Report: *Public Attitudes to Food 2009*[51]	2009	3,219	**97%** of U.K. citizens do not always purchase organic foods	**3%** of U.K. citizens always purchase organic foods
11. USDA-ERS Report: *Organic Agriculture: Organic Market Overview*[52]	2009	N/A	**97%** of U.S. food sales are for non-organic foods	**3%** of U.S. food sales are for organic foods
12. Organic Trade Association[53]	2010	N/A	**96.3%** of U.S. food sales are for non-organic foods	**3.7%** of U.S. food sales are for organic foods
13. American Demographics: *Truth or Scare*[54]	2004	2,289	**98%** of Americans do not always purchase organic foods	**2%** of Americans always purchase organic foods
14. *Attracting Consumers with Locally Grown Products*[55]	2001	500	**92%** of Americans in NE, IA, MO & WI cite taste as the #1 factor in their food-buying decisions	**7%** of Americans in NE, IA, MO & WI cite organically grown as the #1 factor in their food-buying decisions
15. Food Marketing Institute and American Meat Institute Report: *The Power of Meat, 2010*[56]	2010	1,174	**96%** are not vegetarian or vegan	**4%** are vegetarian or vegan
16. Time/CNN Poll: *Do You Consider Yourself a Vegetarian?*[57]	2002	10,007	**96%** of Americans are not vegetarian or vegan	**4%** of Americans are vegetarian or vegan
17. Vegetarian Journal Report: *How Many Adults are Vegetarian?*[58]	2006	1,000	**96.3%** of Americans are not vegetarian or vegan	**3.7%** of Americans are vegetarian or vegan
18. U.K. Office for National Statistics & Food Standards Agency Report: *The National Diet & Nutrition Survey: Adults Aged 19 to 64 Years*[59]	2002	3,688	**95%** of Brits are not vegetarian or vegan	**5%** of Brits are vegetarian or vegan
19. Harris Interactive Poll: *Vegetarianism in America*[60]	2008	5,050	**96.8%** of Americans are not vegetarian	**3.2%** of Americans are vegetarian
20. Vegetarian Journal Report: *How Many Vegetarians Are There?*[61]	2009	2,397	**97%** of Americans are not vegetarian or vegan	**3%** of Americans are vegetarian or vegan
21. *Defra survey of attitudes, knowledge and behaviour in relation to the environment*[62]	2007	3,618	**90%** of U.K. citizens are not vegetarian or vegan	**10%** of U.K. citizens are vegetarian or vegan
22. U.K. Food Standards Agency Report: *Consumer Attitudes to Food Standards 2007*[63]	2007	3,513	**98%** of U.K. citizens are not vegetarian	**2%** of U.K. citizens are vegetarian
23. U.K. Food Standards Agency Report: *National Diet and Nutrition Survey: Adults Aged 19 to 64 Years*[64]	2004	2,251	**95%** of U.K. citizens are not vegetarian or vegan	**5%** of U.K. citizens are vegetarian or vegan
24. *Ipsos Forward Research. Milk Survey: South Africa*[65]	2010	300	**99%** of South Africans do not make milk-buying decisions based on hormone-free labeling	**1%** of South Africans make milk-buying decisions based on hormone-free labeling
25. *Consumer Perceptions Around Dairy and rbST*[66]	2009	1,000	**92%** of Americans make milk-buying decisions based on taste, price & freshness	**8%** of Americans make milk-buying decisions based on hormone-free or organic labeling
26. *The Nielsen Company – Milk Study: Custom Survey Results*[67]	2010	6,685	**91%** make milk-buying decisions based on freshness, fat content, price & taste	**0.5%** make milk-buying decisions based on rbST/rbGH-free labeling
27. *A Report on the Experience of the Fluid Milk Industry's Widespread Shift to an "rbST-free" Milk Supply*[68]	2009	800	**90%** (average) reported no affect of biotechnology on their food-buying behaviors	**12%** (average) report that use of biotechnology affects their food-buying behaviors
TOTAL		70,709	–	–
MEAN	–		**95.6**	**4.3**
CONFIRMATORY STUDY				
28. Nielsen Company October Online Views Survey[23]	2010	26,653	**98%** in the U.S. say that taste (43.48%), cost (31.51%) and nutrition (23.02%) are the top 3 factors considered when purchasing all foods	**1.7%** in the U.S. report they have marched/rallied, protested or picketed a farm, ranch, restaurant or grocery store in an attempt to change food production methods
GRAND TOTAL		**97,362**		

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