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**Jayson Lusk, 2016, *Unnaturally delicious: how science and technology are serving up super foods to save the world*  
St. Martin's Press, 246 p.**

**Gunnar Rundgren<sup>1</sup>**

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The romantic ideal of small organic farms providing everyone with healthy natural food is impossible on a planet of seven billion people, soon to be nine or ten billion, argues Jayson Lusk in his new book, “Unnaturally delicious: how science and technology are serving up super foods to save the world.” In his view, not only is it impossible, it is also not desirable as it would mean that we reject the multiple benefits that the modern food system already has given us. And, there is a lot more to come if we embrace modern food technology. Lusk presents the readers with stories how innovation and technology have found new solutions for, among others, production of eggs, 3-D food printing, robot cooks, synthetic biology, food fortification, genetic engineering, precision farming, meat tissue culture, and food safety.

We can do better, says Lusk. We do not have to choose between prohibitively expensive organic eggs and eggs from hens held in miniscule cages. Instead, we can design smart cages that combine the industrial scale with better consideration of the needs of the hen. Smart cages are just an example of how technology can solve most of our problems. “Sustainability and using agricultural technology is one and the same,” he states boldly.

Lusk deconstructs the idea of natural foods; everything we eat is the result of hundreds or thousands of years of unnatural selection: “Broccoli, cauliflower, cabbage, Brussels sprouts, and kale didn’t exist before humans came along. All these veggies are descendants of the same plant, and they originated through artificial selection.” In the same vein, he argues that genetically modified organisms are simply the next step in this human-managed evolution. Through biotechnology, we will create super foods and at the same time save the environment. Resisting those and other opportunities is unethical in his view: “Technological development in food and agriculture can help us meet moral imperatives, such as helping the least fortunate among us.” Lusk states that the main obstacle to success is that the precautionary principle is taken too far. We need to consider

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✉ Gunnar Rundgren  
gunnar@grolink.se

<sup>1</sup> Grolink International, Sunnansjö Gård, Jarlåsa, 744 96 Uppsala, Sweden

the enormous benefits some of these crops have or will have in the future and accept a degree of risk. Those risks are really very small and hardly bigger than those with traditional breeding.

Another topic addressed in the book is the well-known problem of malnutrition, the hidden hunger. It can be tackled in many different ways, by means of fortification of food, adding the lacking mineral or vitamins, or diet diversification. It can also be addressed by crop breeding to increase the trace element of choice. This could be done with traditional breeding or through genetic modification. The book develops an example of the latter, the so-called *Golden Rice*, a rice fortified with vitamin A that has been developed by researchers since the mid 1980s. Resistance to biotechnology has been the main obstacle for the success of this miraculous rice, Lusk claims, echoing the leading character of the project, Ingo Potrykus. Golden Rice first hit the headlines in 2000 when it made the cover of *TIME* magazine (TIME magazine 2000), “This rice could save a million kids a year.” At the G8 meeting, the same year US President Clinton attacked Europe for moving too slowly over GM food with the claim, “If we could get more of this Golden Rice...it could save 40,000 lives a day” (the Independent 2000). Lusk claims, more modestly, that the delay in approving the Golden Rice has resulted in 600,000–1.2 million additional cases of blindness. Some research (e.g., Wessler and Zilberman 2014) does support the claim that the introduction is hindered by the resistance to biotechnology, but there is also contradicting evidence identifying as the main obstacle to the introduction of the golden rice that it has not yet been successfully developed and embedded in varieties acceptable for farmers (Stone and Clover 2016). There are certainly many countries which grow rice and have a policy environment favorable to genetically modified crops; if this rice really were ready for commercial production, why is it not grown there?

Lusk tells about the rise and fall of Eldon Roth and his company Beef Products Inc. (BPI). For 30 years, BPI operated food processing plants and Roth developed a technology to separate protein from fat in beef trimmings, which otherwise would go to waste. BPI made good business in shipping “finely textured beef” which was what the resulting product was named. Almost three quarters of America’s hamburgers had finely textured beef in them. But, in the early 2010s, media and celebrities such as chef Jamie Oliver rallied against the product which was now renamed “pink slime.” Ultimately, BPI closed three of its plants and laid off more than 600 people. An additional irony is that the use of finely textured beef reduced food waste considerably, and that the food industry is also vilified for this waste. The case is used to demonstrate how media and opinion makers easily sway the public into mistrust of food industries.

In the last chapter, Lusk sums up and advocates for increased food and agriculture research, citing studies showing the extraordinary high rate of return on US public agriculture research. I certainly concur with that conclusion.

He laments, however, that federal research dollars have shifted away from productivity-enhancing research toward research on social goals like childhood obesity, climate change, and the economic viability of organic production and small farmers. This conclusion illustrates the book’s technocratic approach toward food and agriculture. Lusk forgets or neglects that food is a lot more than the intake of exact prescribed quantities of nutrients and that farming is an important tool for mankind’s stewardship of nature. He seems to forget that trade-offs are not only mediated by technology. He laments that, when queried, people tend to see technology and innovation rather as a threat than opportunity, and that they tend to favor more natural agriculture systems and unprocessed foods. But,

he does not really explain and certainly does not provide evidence for why markets and technology would be better equipped to solve the many trade-offs involved in food production than governments, local communities, farmers themselves, or food activists. Introduction of renewable energy, abolition of slavery, animal welfare regulations, and pollution limitations are the results of public policy, which in turn triggered innovation.

Technology and markets follow as often as they lead and Lusk's initial example of the struggles around battery cages in California attests to this. He states that "[o]ne problem is that Californians used the political process to ban a practice that they routinely embrace in the market place. Even before the vote, virtually every major grocery store sold cage-free and organic eggs. Yet fewer than 10% of the Californians were willing or able to pay the extra costs for eggs produced that way." In Lusk's view, this example illustrates why a regulation was wrong, but the example might just as well illustrate why political decisions are much needed in the first place, as the market fails to cater for many so-called externalities of production, such as effects on animal welfare, social conditions, and the environment.

There is much in this book to please a reader curious about what farmers do, food manufacturers are brewing, and scientists are inventing. The relevance of the stories varies and a critical analysis is sometimes lacking. It would be easy to write off 3-D printing of food as expensive, incredibly slow (start your dinner while eating your lunch), demanding (3-D printers require CAD software), and not capable of making most of the food we like to eat. Lusk readily recognizes these shortcomings, which he considers natural for a technology in the making. My concern is more that 3-D printing of food and robot cooks seems to be far-fetched solutions to marginal problems, and it certainly has nothing to do with "solving the world's largest food and farming problems" as the jacket of the book claims.

Some of these major challenges of the agriculture and food system—monocultures, shrinking biodiversity, nutrient leakage, climate change, and excessive consumption of sugar and fats—are recognized by Lusk. He answers mostly through the food scientists and executives who are featured in the book. Their stories are often interesting, but at the same time they enlighten only a limited part of the full complexity of these difficult challenges. Quite often Lusk admits that they are just making partial solutions to complex problems. Regarding obesity there is "no consensus on the causes or the efficacy of the proposed solutions" and Lusk dismisses simplistic solutions like a soda tax. But then, he devotes several pages to the efforts to modify *Escherichia coli* into a probiotic for slimming. Admittedly, he states that this innovation, if it ever reaches maturity, will just be one of the many steps to bring people down to size, but he fails to show that this technological method has any merit over societal, cultural, or political measures. One could of course argue that the obesity problem actually has a quick fix—eating less.

There is no doubt that technology in its wider sense has improved life for huge numbers of people. Plant and animal breeding have given us a variety of useful crops and livestock products. Mechanical devices and tractors have made farming a lot easier. Food processing methods have made food safer to eat and sometimes tastier (think cheese). Sometimes, innovations have improved nutritional quality and the environment but probably more often not. But, some of the progress is a result of campaigns by those food activists that Lusk criticizes or of government regulations (e.g., animal welfare) forcing companies to improve. Technology and innovation will also in the future sometimes make wonders and other times wreak havoc. Some precaution has merit.

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