

# Future of Food





## The Global Challenge

The demand, supply and composition of food over the next decade is facing a number of major challenges ranging from demographics, obesity, hunger and food security to the implications of globalization, sustainability, consumer choice and new technologies. Taken in isolation, each of these challenges provides us with some fundamental decisions. Taken together they are a formidable and accelerating global test.

In terms of demographics, we all now recognize that with the world's population growing to around 7bn by 2020 and 9bn by 2050, meeting our collective nutritional needs is going to be a stretch. Adding on to this is the growing middle class in Asia and Africa, who are demanding more of the less calorically efficient western diet, and, as a consequence, there will be a significant strain on world food resources. Moreover, with an ageing world demanding new healthful foods and a more fragmented market demanding more customization and personalization, food companies are asking how they can deliver the right food to the developed world while delivering enough food to meet the needs and desires in Asia and Africa.

We are in a world of paradox where a growing portion of the developed world is obese at the same time as 15% of the global population is facing hunger and malnutrition as they can't afford to buy the basics. As a result food suppliers are looking for ways to both design foods to help some people eat less while also delivering food that is affordable, safe and nutritious for those who need more. How can we best balance this equation?

We are also in a world where food safety is a growing not diminishing concern. With increased evidence of food-borne illnesses and more prevalent, virulent natural as well as malicious man-made safety issues, we must protect our supplies in order to mitigate the risks. The world regulatory environment is consequently becoming ever more restrictive and the food industry has to both build trust with consumers at the same time as using new affordable technologies to ensure that their food is safe and secure.

Given that 'government' uses regulation and taxes to drive change, a question is what the impact on the economics and profitability of the food industry will be? Globalization continues to break down geographic barriers and equalize food economies across the world, so we face several uncertainties around food supply:

The need for renewable sources of energy is driving the food vs. fuel conflict as bio-fuels compete for food acres and increasing competition raises commodity prices; population change, climate change and security challenges all increase variability and make food supply costs less predictable; and, because of the increasing demand from developing countries, there is significant trade-offs between calories of grain vs. calories of meat and dairy which means that complete protein commodities are becoming increasingly scarce and alternative sources will be required. How then can we control ingredient and energy costs in order to make nutritious food that people will want to buy? How can we ensure that we will have enough protein to meet global needs? How do we ensure a predictable supply of food? And how will new consumers change the demand cycle?

On top of all of this, there is the sustainability challenge: As ever, more unstable weather adds uncertainty to overall food supply and costs, so will increasing over-exploitation of land resources and the depletion of aquifers result in a decrease in the acres of arable land available to grow enough food. In addition, over-fishing of oceans will continue to decrease the supply and increase the cost of fish protein.

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## Options and Possibilities

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There are three main certainties about the next decade which can be seen as demographic, environmental and technological.

Demographically, as the overall global population increases we know, for instance, that by 2020 China and India will have over 33% of the total and the US will, for example, become more ethnically diverse. We know that the food market is very fragmented and there is no 'one size fits all' and as the health challenges of obesity and malnutrition continue. We know that more healthy, nutritious food is a 'must have'. We also know that the right amount of food will not be in the right places to feed the world affordably.

Environmentally, as oil-based energy resources diminish and water for agricultural use becomes more limited, we know that commodities, and especially meat and dairy proteins, will become more expensive. As the world becomes more connected, there will be more global crises related to biological and chemical factors such as SARS, Avian Flu, H1N1 etc. These crises will have socio-economic effects that cause industry shifts in demand and supply as imports / exports are restricted and all of certain livestock (i.e. the chickens in a region) are killed - remember Hong Kong in 1997 and 2008?

Technologically, over the next decade, there will be significant advances in areas such as bioengineering, genetics and nutrition. Advances in information technologies will improve the production and distribution of food. However more paradoxes will continue to exist: obesity vs. malnutrition; traditional authentic vs. bioactive delivery; sustainability vs. convenience; and the anti GMO consumer attitude vs. the need for GMO to feed the world.

What we are less sure about are the unpredictability in consumer attitudes and the technical potential of 'pharma foods'.

Consumer perceptions around the necessary trade-offs between food science vs. food simplicity will be a challenge to manage and may impact the ability of the food industry to implement the needed solutions: Will consumers, for instance, accept the need for genetically modified or artificial foods in order to feed the masses and provide health benefits at lower cost or will they want more natural foods? Equally changing consumer preferences are uncertain: Will demand for expensive individual customization continue to increase while consumers also want less expensive products? Will traditional branded products remain relevant and valued as retailers build their own-brand products? Will customers want convenient single-serve portions while also wanting to be more sustainable?

Pharma-foods, the intersection between food and pharmaceuticals, is an area of growing opportunity for many in the food sector. As consumers demand more technologically sophisticated foods with unique, complex health benefits, food companies will need to respond. We now understand more about individual's disease propensities from the human genome. Therefore nutrigenomic determination of diet becomes technically possible. Technology is advancing and as natural bioactive components are better understood, the line between pharma and food will blur: The challenge will be how to continue to find new ways to continue to provide natural, food-delivered preventative health benefits and begin to provide natural, food-delivered disease state improvement benefits without food becoming a drug.



## Proposed Way Forward

By 2020, it is probable that there will be a number of global policies in place on climate change, energy and agricultural methods. These will be supported by incentives and public / private collaborations to develop new technical solutions. Regulation is likely that will, for example, direct land usage for meat and dairy production vs. grain and it is a good bet that another 'green revolution' will increase the yield of food supply possibly involving bioengineering and genetic modification. These could deliver step-change increases in the efficiency of food production and may involve frame-breaking science such as edible oil from algae and lab-grown meat protein. In addition, the development of non-meat, high protein foods as meat alternatives or acceptable protein vegetable alternatives could help us more efficiently meet the increasing world protein demand.

I see that to both enable and build on this, we should establish a global infrastructure to incentivize public/private collaboration and investment consortia that can be leveraged to advance the necessary technical solutions to address malnutrition, obesity and increasing agricultural production. We need to significantly increase global research investment in biotechnology, genetics, food science and nutrition to reach the technical breakthroughs required for a second agricultural green revolution that will enable us to feed the world. In addition we must invest in exploration/research and development of the meat and vegetable protein alternatives that can efficiently meet the world's increasing need. We should also initiate a coordinated worldwide science education effort to help developed populations of the world understand and accept the technical solutions that will be required solve the coming world food crisis.

At the same time, we must continue to support Africa, India and China in building viable economies to bring the vast numbers of their populations out of starvation and poverty; we should incentivize developing countries to invest more heavily in their own R&D for self sufficiency and potential global trade; and we need to build substantial food education programs across the world which focus on dietary and nutritional health and wellbeing.

In order to achieve this, a number of compromises may be required - some of which are within the control of the food industry and others not: Free market principles may be compromised as governments become more involved in the food business; food companies may need to consider sharing intellectual property more, being open with technical breakthroughs and, in certain cases, trading off competitive advantage for the greater good; food industry profit margin expectations may need to be adjusted or subsidized in order to enable the provision of sufficient food in key regions such as India; producers may be forced to accept reductions in crop yields to comply with sustainability demands, implement significant shifts in agricultural production methods and also grow non-traditional crops to produce the right food in the right quantity for the right geography; the established western companies will need to develop partnerships with new companies from developing countries to gain access to the new markets where most of the economic growth will take place; and traditional western agribusiness approaches may need to change as Asian populations grow and these markets become dominant.

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## Impacts and Implications

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In the next decade, the world economics of food will change and food will change the economics of the world. Investment in food production, research and technology development must become a priority. Consumers and society in general will need to become more literate in science and more science education will be required for the population to understand and accept the technology required to feed the world: The natural / local / authenticity trend may become obsolete. The global community (governments, academia and industry) will need to collaborate in a much more effective way or face the societal, ethical and political consequences of large portions of the population not having the food they need. World food production and agriculture must become more globally integrated - A true working world market will be required. Decisions on where and what to produce must be made on a global basis not on an individual market or geography. Political and societal pressure for change will increase as the population and need for affordable food increases in Asia, Africa and India and the disparity between the West and emerging economies around food becomes even more stark.

As a result, the dietary habits of consumers may well change due to availability and the prices of agricultural materials: For example, western populations may need to adjust to consuming more plant based sources of protein as their choices for protein may decrease. In addition, driven by economic and/or political pressure, consumers may also be required to change their food shopping habits.

The future of food will have major implications for many other areas: The supply of energy; the use of water; the processing of waste and the state of our health are all obvious arenas of direct influence, but food will also

both impact and be impacted by future choice, authenticity, connectivity, work and money. Food is fundamental to economics, politics and other societal issues whether directly or as support technologies.

If we get the regulation, technology and consumer attitudes right, over the next ten years we can make a shift: We really do have the opportunity to address the challenges presented to food by the demands of demographics, obesity, hunger and food security and the implications of globalization and sustainability. The issue is how best to do this collaboratively.



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