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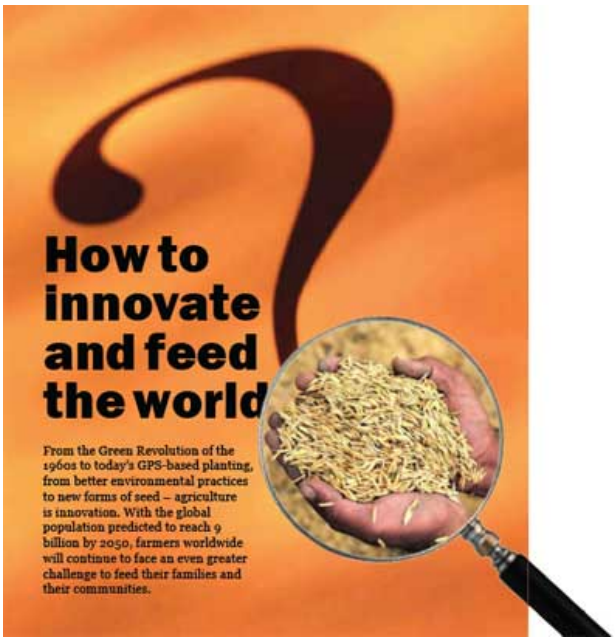
HOW TO INNOVATE AND FEED THE WORLD



Huge discussion is going on about the future of the planet, the scarcity of resources, lifestyles, consumption, the availability of food and land, carbon prices, inflation, water, obesity and a few other things that have made us a lot more sensitive to the fundamental changes taking place around us.

Global consumption of wheat is growing (three years average) 10 million tonnes a year, corn almost 30 million tonnes a year and soya 20 million tonnes a year. The consumption of meat grew almost 20 percent in nine years. In essence, we have access to food but production is not responding the way it should. Last year alone we had a deficit of 50 million tonnes of grain.

By far Asia is leading this process, by creating a huge middle-class income population, with a possibility of almost 1 billion people moving toward being middle class. All forecasts done 10 years ago on production, exports and imports in China were incomplete, and some were plain wrong. In 1995 China produced and consumed 14 million tonnes of soybeans. Last year it produced 14 million tonnes and imported 70 million tonnes, and these figures exceed what was projected for 2030.

It is not only in China that food markets are growing at incredible rates. The food market in India will grow from $155 billion in 2010 to $260 billion in 2015. In the same period, Thailand's food market will grow 50 percent and Indonesia's from $65 billion to $100 billion. Imagine what is happening in Middle East and Northern Africa countries, in Africa as a whole and in South America, with the booming economies of Brazil and Argentina representing almost 250 million people.

So if we don't come with innovative solutions in the food chains producing process, society will face problems in the future. Just remembering, a food chain is a complex organization, coming from the input suppliers to farmers, food processing industry, retail and distribution and finally, reaching the final consumers of the products produced Innovation is a key word in order to face this consumption pattern. This article has the objective to raise several innovation points at the food chain, with the purpose of becoming an agenda for discussing possible sources of innovation. We will start with inputs, than moving to plant and animal production, then the food industry, retail and consumer.

We must realize that inputs play a key role on food chain. When properly produced and used, they help farmers reach good yields, high quality products, and larger revenues, and help consumers to have safer, tastier and cheaper food on their tables. In the other hand, inappropriate production and use management may lead to resource over exploitation, negative margins to farmers, and more expensive or unhealthy food to families around the world.

Therefore, input management is one of the biggest challenges when it comes to food security. In order to overcome such problems, researchers from companies, universities and governments around the world have been seeking innovation on input production and application. Among them, we can list the use of renewable sources and product reuse and recycling, higher machinery efficiency, natural/biological pest controls, renewable production inputs that replace not-renewable ones, such as today's fertilizers; innovation that allow the reuse of resources and the use of byproducts in order to reduce pollution that reduces costs, such as new planting technology.

We also need better grain to protein (animal) and sun to energy (plant) yields and biotechnology and natural control in order to use less chemical products and finally, innovation that reduce losses on transport and application of inputs at the farm level.

When moving to animal and plant production we need to increase land productivity; shorten plant production cycles; increase efficiency in land operation and management; search for lower environmental impact technologies (recycle, synergies among food chains, energy savings technology); have more efficient and conservative soil operations; have localized and adapted solutions and use renewable energy sources (produced locally) for fueling the high energy demanding agricultural activities.

The agenda shows to the development of technologies to release more of the potential of the grains contents (energy, protein); precision plant nutrition avoiding losses in the process; plants more efficient to use and transform the resources into production (water, sun, nutrients) and plants much more resistant to adverse conditions (diseases, droughts and other damages).

Particularly in animal production, we should research for better understanding of the nutritional requirements for all species; technologies to increase productivity of raw materials as feed; thinking in productivity per hectare (protein per hectare); alternative programmes for disease control and the need to better understand microbial processes (pathogens, micro- bios) and the environmental and health consequences; added value via nutraceuticals, natural medicine and health joined with nutrition; search for alternative proteins like algae; identify cost-efficient alternatives to antibiotics; micro-encapsulation for controlled release of nutrition; animal welfare management and genetic development for sex selection (example: only female layer chicks would reduce cost and improve animal welfare), among others, are topics to be pursued at animal production.

After plant and animal production, we flow to the agro-industry. Due to its close contact to consumers' needs and desires, this might be the component of the food chains where most innovation is taking place. Feeling the pressure for more environmental friendly, healthier, and distinguished products, the agro-industry has invested on ecological packing, products with different or better flavour, products that not only satisfy ones appetite but also work as medicine or cosmetic – the nutraceutics and nutria-cosmetics. They invest not only in product innovation, but also in process innovation that allow, among other things, lower water use.

Their agenda also addresses to develop recyclable and biodegradable packaging materials, innovation regarding conservation, for instance, in order to increase shelf-life, flavour improvement, storage and the reduction of transportation costs.

As well as at the farm level, agroindustry must develop processes that require less water usage. It's necessary to reduce losses and wastes. One way of doing it is through promoting the use of byproducts. A new attitude towards business-to-

business relationships and innovative contractual arrangements that benefit the chain as a whole and consequently the consumers is taking place. Companies are also searching for new technologies that deliver industrial optimization and to develop new channel opportunities.

The food retail innovation brings us to supermarkets promoting new buying experiences, such as tasting areas, new ways to offer the products, offering complete solutions, increasing benefits for consumers, supermarkets becoming a place of knowledge transfer, where the consumers learn about the products they eat, becoming a place where the industry communicates with its final consumers. Supermarkets are trying to regain some market share that they have been losing to foodservice, such as restaurants adding each time more the home meal replacement strategies.

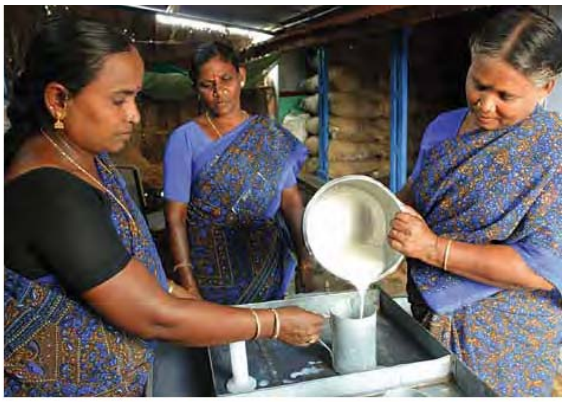
When moving to consumers' needs and desires, we must understand that these have been changing in an even change is the demand for healthier food products. We look for products that promise to let us look prettier or let us live longer, for instance. We also don't have much time for our meals any more, so we look for food on the go. In the other hand, if you choose to take your time to eat, you'll leave the fast food aside and engage on the slow food movement. Consumers are also valuing companies that attend the social concerns by promoting inclusion, wealth distribution and fair trade. Consumers are also innovating in the way they communicate and obey companies to respect environment and other causes.

In terms of waste management, we should develop more tools to analyze all the food losses within chain participants (at home/cooking, supermarkets and restaurants, industry, farm, storage, transport); effective portion sizes (avoiding waste); develop processes for re-cycling and utilization of by-products and manure, particularly by-products of growing biofuels production.

Another efficiency gain may come from Government, searching for innovation and efficiency in public management systems; harmonization of worldwide regulatory systems to improve efficiency and reduce transaction costs; the formalization of illegal and informal chains, that in some markets still represent 50% of market share; promote and facilitate financial flows and investments to agriculture; build innovative financial support systems for emerging nations and integration of regulatory groups with the private sector. This innovative management behaviour may allow reductions, contributing to food accessibility.

Efficiency will come from diffusion and knowledge transfer, establishing a global online network to generate new technology and development to reduce response time (including all chain participants); social media to market and communicate innovation (web transfer); better communication with consumers about biotechnology; improve the image of agriculture and food production; use retail outlets and other points of sales as points of communication about new trends; guide about products/markets/trends in overall production chain (get closer to customer); extend technologies to backward parts of the chain (farmers spread all over) with extension systems; build bridges with developed and emerging economies to spread technology transfer and develop suitable practices for different markets and levels of development, with localized solutions.

Finally, in storage and movement, we should optimize logistics within the entire supply chain, more efficiency in emerging countries with poor infrastructure; better storage capacities and use renewable fuel sources for transport, reducing carbon footprint, among others.



To make all this happen, we need a research and innovation architecture that considers building alliances with banks, universities, competitors, raw materials suppliers. We are entering the era of public and private sector partnerships, building cooperatives for innovation; working together with the regulators and university and focusing on solution driven management of research and development.

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