

Special Edition
"Food Security and Food Sciences"

Editorial

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Food Security: A Long Term Issue

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Food security.....the term is often used, and a number of definitions have been offered for it. The United Nation's FAO Committee on World Food Security offers this: "All people at all times have both physical and economic access to the basic food they need". "All people," at present, means more than 7.3 billion inhabitants of this planet, with that number growing by the day. In fact, despite efforts to the contrary, the world population continues to expand at an alarming rate relative to humanity's past. Although *Homo sapiens* has inhabited this planet for over 2.0 million years, it took until the early 19th Century before its numbers reached 1.0 billion, but not even a century for the population to approach 2.0 billion. That's correct, the human population of this planet stood at 1.6 billion at the start of the 20th Century, yet now, 115 years later, we are rapidly approaching 7.5 billion people on the planet Earth.

Although the last 50 years have seen a decrease in the rate of population growth, due to increased use of contraception, later age of marriage, especially for women, and a voluntary reduction in the number of children reared in the more developed countries, the reality is that the overall world population continues to grow. In particular, the developing world, which is least able to meet the FAO's definition of food security, continues to record high birth rates. In 2014, the top three countries in the world for birth rates (all in Africa), recorded >40 births per 1,000 population. In comparison, the country with the lowest recorded birth rate last year, Monaco, had 6.7 births per 1,000 population.

At the current rate of growth, the Earth's population is expected to reach 10.0 billion soon after the year 2050. According to the World Bank and the United Nations, 1-2 billion people in the world remain malnourished due to insufficient food, low incomes, and inadequate food distribution. If this trend continues to 2050 and beyond, we can expect 1.3-2.7 billion people to be in a similar circumstance. But hopefully, much of the rhetoric we hear about "feeding a hungry planet" will prove true. Certainly, to listen to vested interests in the agriculture and food sectors, we have only to continue to adopt new technologies to reach these starving masses and to meet the needs of the still unborn 2.5+ billion future inhabitants of the planet. Perhaps they are right. We can only hope so. But it is a daunting challenge indeed, particularly when we consider all the "gauntlets" that have been thrown down. "Crop yields will continue to increase, the developing world is just starting to eat meat at levels rivalling the developed world, so poultry, pork and beef production can continue to expand. Dairy consumption by heretofore low level consumers (e.g., Asians) has great upward potential".

This all sounds like very positive news for the world's hungry and especially for the world's providers of these commodities. But few people have projected much beyond 2050. Instead, we hear about an expanding market (the population and its demand for food), and when it comes to feeding that market, we only talk about growth, growth, and more growth. Every company is going to grow its market, grow its sales, grow its profits. Yet, when does this growth "hit the wall"? That is, when is the population so high, and the food production so great, that we simply cannot sustain growth any longer? Is it in 50 years, or 100 years, or 200 years? Because those times will come, and not that long from now. Actually, 500 years and 1,000 years from now will eventually arrive as well. What will the world population be then, and how will it be sustaining itself at that point? Will every farm and every food and food-related company STILL be in a "grow at all cost" mode of thinking?

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As a brief, albeit simplistic example, the Chinese swine industry has grown tremendously in the last two decades. In 1975, annual pork consumption per person in China was <10 kg. Now, it is close to 40 kg per person per year, surpassing the US annual *per capita* rate of consumption. In 2014, ~700 million pigs were slaughtered in China, accounting for ~51% of all the pigs slaughtered in the world. The Chinese industry, although suffering a recent setback due to disease problems, looks to the future with nothing but optimism from a growth perspective, and with the population soon to reach 1.5 billion and *per capita* meat consumption continuing to increase, there is every reason to believe that growth in this sector will continue its upward trend.

It's easy to predict what this growth will look like in 2050, because on average, the Chinese swine industry has been expanding by 3-4% per year. This, of course, catches the eyes of the major world grain and oilseed producers, who see the opportunities that this will provide to expand soybean, corn, sorghum and barley exports to China. As well, animal feed additive and animal health companies have flocked to China, seeing the opportunities this expanding market offers for their products. But has anyone projected as to what the Chinese or the world swine industry would actually look like and require for grains and other feedstuffs to feed its animals in 100 years or 500 Years with even minimal continuous annual expansion (e.g., 1%)? Likely not, since we tend to think in terms of our lifetime and our comfort, notwithstanding platitudes about "future generations".

If 2014 statistics are used, then 723 million pigs were slaughtered in China. That represented 51% of all pigs slaughtered in the world that year, or ~1.418 billion pigs. That's a lot of pork. But remember, we are going to "feed the world" with our technology and that means putting more meat into more mouths, so we will use a conservative figure of 1% growth in swine production to account for greatly expanded world *per capita* meat consumption in the next 100 years, as well as continued population growth (we assume). Then the number of pigs that will be slaughtered in 2115 will be 3.835 billion. If the growth rate in the swine sector over that time period is actually 2%, then there will be 10.273 billion pigs to process. It may be a leap in reproductive faith to think that the human population will still be increasing in 500 years (if *Homo sapiens* still exists), but 1% continuous growth in the swine herd around the world for that length of time would mean that we would have 205.3 billion pigs to process in the year 2515.

Those numbers are a bit sobering, and we did not even mention comparable growth in the poultry, dairy, beef, lamb or aquaculture sectors (the poultry sector is likely to expand at an even greater rate due to its more efficient production and its overall better acceptance throughout the world). Setting aside the issues of manure disposal and greenhouse gas emissions that swine and other livestock sector growth will generate, we would also need to address the increased demand for feed ingredients. At present, the world produces ~2.7 billion tonnes of total grains, legumes and oilseeds, with much of that being used for human consumption (i.e., rice, corn, wheat, etc.). In 2014, ~996 million tonnes of grains, oilseeds, plant and animal by-products were used to make compound animal feeds, and an untold quantity more of those grains and oilseeds were mixed on-farm to feed animals. Just to feed 3.835 billion pigs, at an average feed conversion ratio of ~2.7 kg of feed per kg of pig would require ~1.06 billion tonnes of feedstuffs (assuming 100 kg animals). Yet, swine feed accounts for only 25% of total world animal feed consumption, so there would be a need for >4.0 billion tonnes of grains, oilseeds, etc., just for animal feeds, not to mention the rice, corn, wheat and other agricultural products that are used for direct human consumption. Indeed, our plant breeders had better provide some miraculous increases in yields, because there is precious little new arable land on the planet to access. Even with improvements in animal feeding efficiencies (better feed conversion), at some point, growth will need to cease. The planet will simply not bear either further increases in the animal population or the grains, legumes and oilseeds that are needed to feed them. If the population actually begins to decline at some point in the future, then the need for more food will also decrease. But are we to count on that happening, and if so, when will it occur?

What are some of the potential solutions should our population continue to expand? The developed world over eats. The underdeveloped world under eats. One can draw the appropriate conclusion from that fact. In the animal production industry, producers go to great lengths to feed their animals the minimum amount of nutrients at the least cost to achieve the best performance. Yet, a large part of the human population eats to great excess, often to the detriment of its health and its pocket book. Animals are fed to their "need," while we eat to our "want". Can the guilty portion of the population continue this interminably?

We also think nothing of wasting food. At least one-third of all the food produced in the world is wasted. So, for those of us who believe that: "*We can feed the world by increasing food production,*" if the issue of food waste is not addressed, we will be increasing production so that we can throw one-third of it away. That is a waste of one-third of our resources and one-third of our time. In the developing world, most of the waste occurs post-harvest, because the proper supply chain mechanisms are not in place to keep food intact and safe before it reaches the consumer. For the developed world, food is, for the most part, simply thrown away. Some of that is inevitable, but much of it is inexcusable. Food security is an issue that will not go away, and it will grow in scope and importance with every passing decade. Let's think of our future generations now, and contribute solutions to the problems that they will inherit.