



Panic buying and food riots - the global food crisis revisited

By [Joseph Dancy](#) - posted Thursday, 1 October 2009

[Sign Up for free e-mail updates!](#)

A tribute to Dr Norman Borlaug.

The collapse of Australia's rice production last year was a major factor contributing to the doubling of global prices. Six long years of drought extracted a heavy toll on production. Price increases led the world's largest exporters to restrict rice exports which spurred panicked hoarding in Hong Kong and the Philippines and set off violent protests in countries including Cameroon, Egypt, Ethiopia, Haiti, Indonesia, Italy, Ivory Coast, Mauritania, the Philippines, Thailand, Uzbekistan and Yemen. Major grocery store chains in the US limited how much rice customers could buy at one time - restrictions not seen since World War II.

With the recent passing of Norman Borlaug, the "Father of the Green Revolution" and the 1970 Nobel Peace Prize recipient, and the destabilising impact the food shortages and price spikes had on numerous countries last year, perhaps it is time to re-examine long term global food supply and demand trends.

Food is - for the rich world, at least - astonishingly cheap. The average British household spends 13 per cent of its income on food. Fifty years ago that figure was 30 per cent. Because food supplies have been so abundant and affordable few realise the massive impact the Green Revolution of the 1950's has had on our lives. Corn yields in the US increased from 25 bushels per acre in 1900 to 40 bushels per acre at the start of the Green Revolution in 1950. This was an impressive gain, mainly due to the mechanisation of the farm but nothing like what would be seen over the next few decades.

Corn production per acre rose three-fold in the five decades after 1950 to 120 bushels per acre. The United States Department of Agriculture (USDA) estimates this year's corn crop will see yields rise to a record 160 bushels per acre - a four-fold increase from 1950! Production of wheat and soybeans have seen similar gains over these time periods, and the world's grain production has more than tripled since 1950.

Few areas of the global economy have seen such impressive growth in productivity. Without the global growth in grain production from the Green Revolution some estimate that the world could only support about 4 billion people - well under the current global population estimated in excess of 6.5 billion and growing.

The million dollar question becomes, how did we increase agricultural production so abruptly? Can we continue to see these productivity increases in the future?

Breaking down the Green Revolution we find that the keys are two-fold. First, agriculture moved from an organic focused means of production to inorganic focused technologies. The inorganic technology used an increasing amount of petroleum based and energy intensive fertilisers, insecticides, herbicides, fungicides, and machinery - as well as antibiotics and steroids on animals. Global fertiliser consumption has more than doubled since 1970.

Fertiliser is a combination of nutrients. The three most important are nitrogen, phosphorus and potassium. The latter two have long been available. But nitrogen in a form that plants can absorb is scarce, and the lack of it led to low crop yields for centuries. That limitation ended with the invention of a procedure that draws chemically inert nitrogen from the air and converts it into a usable form using natural gas as both a fuel and feedstock.

The second key to the Green Revolution was the development of plants that could effectively utilise the energy provided by these nitrogen fertilisers. This is where Dr Borlaug's expertise came into play.

Much like the impact of steroids on animals, fertilisers have an incredible impact on plant growth. In the case of wheat, the grain became so heavy the stems collapsed under the weight and the crop was left on the ground and was not mechanically harvestable. Borlaug selectively bred the wheat to enhance its characteristics, making the stems shorter and stronger, which supported the plant and allowed mechanised harvesting.

Insecticides, herbicides, and fungicides also played a key role in enhancing yields. Borlaug and others bred disease resistant genes into many of the plants. For wheat, stem rust is the most feared of all diseases. It is a cancer that can turn a healthy crop of wheat into a tangled mass of stems that produce little or no grain. The infection spreads quickly by windborne spores. Wheat rust has caused major famines since the beginning of history. In North America, huge grain losses occurred in 1903 and 1905 and from 1950 to 1954. Agricultural chemicals have helped keep these diseases at bay.

The amount of energy consumed using modern agriculture practices has increased exponentially. To obtain the quadrupling of grain output since 1950 some estimate we now use 30 to 50 times as much energy. Fertiliser is an extremely energy intensive product. Mechanised planting and harvesting requires a vast amount of diesel fuel. Processing, packaging, shipping and storing add to the energy intensive nature of the product.

Some estimate Western diets utilise 10 calories of energy inputs for every calorie we consume. "Eating fossil fuels" is how some sceptics have described the process. As globalisation continues the diet of many developing countries has become westernised - requiring much larger energy inputs than we have seen historically.

Can we continue to expand our agricultural output to feed the world? Or will we see price spikes and food riots in the future? In our opinion the following major threats exist for the global agricultural sector:

- Fresh water will be required in increasing amounts to maintain and expand global agriculture output. Groundwater is becoming more expensive to pump in many areas, and is non-existent in others. Desalination of seawater is very energy intensive and generally is not economic for agriculture use. Irrigation is critical.
- Modern agriculture is an energy intensive business. The cost of diesel fuel, natural gas, and fertiliser inputs will influence crop economics. Irrigation and pumping can also be energy intensive. Price volatility in the energy and fertiliser sectors makes it very difficult to plan what crops to plant, and in what quantities. When input prices increase, agricultural prices must increase or fewer acres will be planted. Many parts of the globe cannot afford expensive grains, and by implication expensive energy.
- Global population and economic growth will result in more people eating increasingly energy intensive foods as they "Westernise" their diets. Demand for grains as a biofuel or animal feedstock will also increase.
- A crop failure in North America or Australia would have severe implications for global grain prices.

The US, Canada, and Australia are the major global grain exporting countries. An early freeze in the US grain belt, or a disease such as UG-99 (a wheat stem rust now threatening India), could severely impact crop yields.

In light of these threats it is our opinion that mankind's greatest challenge over the next 50 years will be supplying adequate supplies of reasonably priced (1) energy, and (2) food to support the globe's growing population and economy.

While food riots and rising prices are not in the headlines today, the underlying challenges in the agricultural sector remain. The easily obtained gains in yields have been achieved. The most fertile lands are already under cultivation. In the future, progress will most likely be more difficult. Like the energy sector, additional capital will be needed to insure we can enhance agricultural productivity to meet increasing global demands.

While there are critics of the Green Revolution and the massive changes it has brought to the agricultural sector and the world economy, Dr Norman Borlaug was probably one of the greatest Americans - possibly one of the greatest humans - to have ever walked on the face of the earth.

The number of people across the globe who have escaped famine and are now alive and enjoying a robust diet due to his discoveries can be measured in the billions. For the vast majority of these people, the irony is his name and achievements will forever remain an unknown.
