Increased oil prices and a new awareness of the potential detrimental effects of human activity on the environment have shaped the world’s priorities in the last few months. This has touched the lives of millions of people, many of whom may not even be aware of the immediate consequences of this new consciousness. As soon as governments announced that food crops such as corn and sugarcane would be used to produce biofuels as an alternative to oil, the prices of these commodities skyrocketed and their availability rapidly decreased. For example, in Mexico, during late 2006 and early 2007, corn prices increased almost 70% within six months.

According to the U.S. Department of Agriculture (USDA; 4), this year the United States is going to use 18–20% of its total corn crop for the production of ethanol, and it is estimated that by 2008 that figure will jump to 25%. As the ethanol industry absorbs a larger share of the corn crop, higher prices will affect not only domestic uses but also exports. This will provide for a more intense competition and demand for basic grains for food and feed production in addition to their use for food ingredient production, i.e., starch and high fructose corn syrup. According to the USDA, U.S. feed corn typically accounts for 50–60% of total corn production, and the United States typically represents 60–70% of world corn exports. In addition, to date, the growth in coarse grain trade is strongly linked to the expansion of livestock production in regions unable to meet their own forage and feed needs. Mexico, along with China, North Africa, the Middle East, Southeast Asia, Japan, and South Korea, represent large, mature markets for these grains. Thus, as the use of corn for production of alternative fuels increases, the available corn for food and animal feed production as well as that available for participation in the export market will decrease, greatly impacting the more vulnerable populations whose diets depend strictly on these basic grains.

In Mexico, these are not good days. The worst tortilla crisis in modern history is rapidly evolving. The dramatic rise in international corn prices spurred by the increased demand for grain-based fuel ethanol has led to extremely expensive tortillas, the staple for a large segment of the population. Tortilla prices have tripled or quadrupled in many parts of Mexico within the last year. At the peak of the crisis, President Calderón announced an agreement with business leaders to cap tortilla prices at US$0.78 per kg, less than half of the highest reported prices, in an attempt to protect food availability. However, this price cap does not carry the force of the law and cannot withstand the market pressures. In other countries, these issues may not represent such a crisis, but Mexico is different. Corn is deeply rooted in culture and society. In addition, different reports estimate that, for a large poor segment of the population, tortillas represent between 40% and 50% of the daily caloric intake.

Nixtamalization, the traditional tortilla making process where kernels of white corn are mixed with calcium hydroxide, boiled, and steeped before grinding on a volcanic rock mill, releases antioxidants and niacin, making them available for absorption. In addition, tortillas are an important source of dietary fiber and, due to the limewater process, contain enough calcium to prevent diseases commonly associated with dietary calcium deficiency. Although tortillas are generally made with white corn and ethanol is produced from yellow corn, in Mexico, the price of white corn is indexed to the international price of yellow corn. Thus, there is a consensus that, in addition to endangering the economy of thousands of tortilla makers, the higher demand for ethanol will inevitably have fatal consequences for the Mexican diet. Although there are a couple of major industrial corn flour companies in the country, the tortilla market in Mexico is still very artisanal. It is hard to estimate the actual number of tortilla makers in Mexico, but the 2004 Economic Census (2) reported a total of 63,459 establishments dedicated to nixtamalization and tortilla production with a total of 154,280 employees. These estimates may fall short since many small establishments may not be formally registered. Some informal surveys estimate up to 200,000 establishments.

It is also important to consider the impact of this crisis on the animal feed production industry and the subsequent aftershock on animal production that is directly reflected on the price of food and the number and availability of jobs generated by these industries.

Will the Pressure be on Quality?

Pet food recalls in 2005 and 2006 in the United States and Venezuela due to aflatoxin contamination and the more recent 2007 recall due to contaminated gluten and rice protein in the United States bring about new questions. How will the increased demand for grains for fuel production affect the quality of ingredients used for food and feed production? The impact on availability and cost is evident. This, however, leads to other questions. With higher prices for these commodities and compromised availability, will companies have to lower their standards, and more importantly, what impact will this have on consumers? Many small- and medium-sized companies, and in some cases regulatory agencies, in Latin America may not even have the analytical capabilities to track grain contaminants, further compromising the health of the already challenged populations.

The lack of food availability has a direct influence on the quality and safety of food ingested by challenged populations. The most dramatic example of this are the aflatoxin poisoning...
cases reported in the Eastern and Central Provinces of Kenya since 2004, where drought and crop failure led to the consumption of highly contaminated corn that resulted in acute poisoning and claimed many lives (1). Although these are extreme cases, the outbreak cannot simply be attributed to food contamination because most of these individuals would not have consumed such large doses of aflatoxin if they had had adequate food availability and variety. Along the Texas-Mexico border, the exposure to Fumonisins, mycotoxins produced by Fusarium contamination, mainly from corn tortilla consumption, has been related to the occurrence of neural tube defects (3). The populations at higher risk are usually those whose diets are mainly based on corn, leading, again, to question the impact that higher demand and lower availability of food crops will have on the safety and quality of basic foods.

The presence of natural contaminants is not the only concern since issues related to intentional adulteration of food and feed ingredients have also recently made the headlines. The Chinese protein export scandal was first identified after the wide recall of many brands of cat and dog food starting in March 2007. The waves of extended pet food recalls in North America, Europe, and South Africa have eventually led people to question the safety of the food supply. The first and most easily identified contaminant involved in the recall was melamine, which was most likely added to fraudulently increase the apparent protein content of vegetable proteins. However, melamine is not considered to be highly toxic to animals or humans. As a result, investigators have continued to examine the role of other contaminants, such as cyanuric acid. Current research is focusing on the combination of melamine and cyanuric acid. According to the U.S. FDA, the vegetable proteins involved may include wheat gluten, rice gluten, rice protein, rice protein concentrate, corn gluten, corn gluten meal, corn by-products, soy protein, soy gluten, proteins (including amino acids and protein hydrolysates), and mung bean protein. This has led to public outrage, but most importantly, it has brought attention to the grain crisis and its impact on food availability. Will these incidents occur more frequently with the increased market prices and demand for basic grains? If we bring this question back to Latin America, we must consider the impact on the food supply and the ability to control these issues.

One obvious answer to the crisis is to look at the domestic production of basic grains. However, in many Latin American countries, domestic production is not enough to cover the demand. For example, in Mexico, the corn sector is mostly devoted to the production of white corn in a large number of very small production units, typically less than 10 hectares, marked by low mechanization, lack of technology, and low yields. The majority of these producers are obviously far from being prepared to face the challenges brought by the new market structure.

Is Biotechnology the Solution?

The use of biotechnology to increase quality, productivity, and yield has been on the forefront of many debates in the last decade, particularly in Mexico where discussion has been focused on the use of genetically modified corn. Mexico is considered the cradle of corn. Thus, the fear of contamination of indigenous varieties has triggered arguments against using this technology. The use of biotechnology may be an alternative to increase yield and productivity and alleviate some of the crisis. The basic grain crisis is multifactorial and cannot be oversimplified, so biotechnology represents only one approach. However, if it is to be used, it should be done responsibly, strictly adhering to adequate regulations.

During a press conference in January 2006, different Mexican stakeholder organizations agreed that increasing the productivity of Mexican fields is essential to address the increase in corn prices and its impact on the price of other basic products. During this conference, Jaime Yesaki Cavazos, president of the Consejo Nacional Agropecuario (National Agriculture Council), stated that the main issue is that Mexico needs to produce more corn to guarantee domestic availability. Cavazos declared that approximately 90% of the corn imports in Latin America come from the United States, where two-thirds of the corn production comes from genetically modified seeds and production costs are significantly lower to those in Mexico. During this conference, different stakeholders agreed that both improved hybrid varieties and genetically modified seeds have contributed to the increased yield in different countries such as Argentina, Brazil, Spain, the United States, China, and Canada. Cavazos also stated that, globally, yields have increased up to 15% due to the use of improved varieties, while Mexico still has one of the lowest yields with an average of 2.9 metric tons per hectare. Thus, he insisted that the use of new technologies in Mexican fields will be essential for increasing corn productivity and overcoming the challenges facing this extremely valuable crop.

Whatever the future brings, it is certain that the trends for increased demand for basic grains for nonfood uses will remain. Latin America will have to find a way to address this challenge with better public policies, increased grain productivity, and improved quality control. It is imperative that Latin American countries not only survive the crisis, but also find a way to protect food availability, safety, and quality, as well as the welfare of the most vulnerable population, and maybe, find a way to successfully ride the wave of new opportunities.

References


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