Biofuels & Food

Recent price increases in corn and wheat have cascaded in the food chain resulting in a price increase in foods (pasta, bread, milk, meat), which was swiftly attributed to increased biofuels production. While it is true that the price of agricultural raw materials has risen, the alleged impact of biofuels on food price is disproportionate and a number of factors, including bad harvests in Australia and Ukraine in 2007 and an increased demand for meat in developing countries are responsible.

1. Are biofuels causing food prices to rise?

It is important to note that the current prices of wheat and corn are not unprecedented. Previous peaks were not due to biofuels and did not create a food crisis or dramatic increase in food price. In the past 30 years, the price of corn price went above $3/bushel (€120/tonne) in 1981, ’83, and ’95 for reasons totally unrelated to bioethanol production, which was virtually nonexistent before 2001, and fell back after one or two years.

Globally, world meat production has increased by around 65% during the last 20 years, increasing the demand for feed. For the production of 1 kg of meat on average at least 3 kg of cereals are needed. Meat consumption increase is most acute in India and China, as the wealth of a country increases, the demand for meat and dairy products tends to increase. Meat consumption in China alone increased from 27 to 59 kilogram per person per year between 1990 and 2005. Each additional kilogram increase on average in China results in a need for roughly 3 million tonnes of animal feed. This has been the one of the largest drivers of the rising price for cereals on the world market.

Production of meat in China

<table>
<thead>
<tr>
<th>Year</th>
<th>Meat production (tonnes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990</td>
<td>30117662</td>
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<tr>
<td>1995</td>
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<tr>
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<td>2006</td>
<td>81733348</td>
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The price tension on the market created by high demand was reinforced in the past years by poor harvests and record oil prices. According to the FAO, much of the poor performance of world agriculture in 2006 was due to disappointing cereal production, which fell for the second consecutive year as a result of poor weather conditions. The cereal harvest was especially poor in Australia and the United States where it fell by 60% and 7% respectively. The price of oil has increased from 25$ to 100$ per barrel, heavily impacting agriculture production, processing and transportation costs.

US Farm price for Corn between 1979 and 2007

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These factors that would typically not converge on any one year have created a temporary volatility in food prices. Experts expect the price to stabilize. Ms Fischer Boel⁴, EU Commissioner for Agriculture and Fisheries has stressed that the increase in food prices is not only due to agricultural prices. Cereals, for example, only make up around 4 per cent of the consumer price of bread.

2. Does the higher price of raw materials increase food prices in developed countries?

Firstly, the 2006–2007 increase in food prices must be put in perspective. Historically, food prices are low compared to food prices over the last century. One group (National Farmers’ Union) estimates that if the price of wheat had increased with inflation it would now be worth about 900 EUR/tonne rather than the current 150 EUR/tonne. Food prices generally have decreased over the last 30 years (60% from base level 100 in 1957) and the cost of raw material has fallen about 20% from base level 100 in 1957⁵.

Secondly, food prices and agricultural raw material prices are not directly linked in developed countries. Energy prices have a two to three times higher impact on retail food prices than raw materials prices⁶. Following the oil crisis in 1973, the price of food soared by 200%.

Finally, in developed countries, the share of raw materials costs in final products is limited: only 10% for bread, and 20% for chicken in the US. The bulk of the costs are associated with processing and distribution. In developing countries however, the price of food is more directly linked to raw material prices (see point 3 below).

<table>
<thead>
<tr>
<th>Product</th>
<th>Country</th>
<th>Costs for raw material as % of commercial price</th>
<th>Effect on commercial price of 50% increase in costs for raw material</th>
<th>Effect on commercial price of 100% increase in costs for raw material</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bread, Breakfast</td>
<td>U.S.</td>
<td>10%</td>
<td>5%</td>
<td>80%</td>
</tr>
<tr>
<td>cereals and other products</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tortilla</td>
<td>Mexico</td>
<td>80%</td>
<td>40%</td>
<td>80%</td>
</tr>
<tr>
<td>Meat* and eggs</td>
<td>U.S.</td>
<td>25–50%</td>
<td>12–23%</td>
<td>25–50%</td>
</tr>
<tr>
<td>Chicken*</td>
<td>U.S.</td>
<td>20%</td>
<td>10%</td>
<td>20%</td>
</tr>
<tr>
<td>Cheese</td>
<td>U.S.</td>
<td>33%</td>
<td>17%</td>
<td>33%</td>
</tr>
</tbody>
</table>

Note: * The effect on the commercial price of meat and chicken could be lower, as the by-products of ethanol production, gluten meal, can be used as feed. Source: Data, European Commission, FAPRI & FAO⁷.
3. How do the higher prices of raw materials affect food price and availability in developing countries? (See also factsheet ‘Biofuels and developing countries’)

Worldwide, food availability per capita is higher than ever before and on average is above minimum dietary energy requirements even in Africa and sub-Saharan Africa. Hunger is not only a problem of food availability but factors like political stability, infrastructure, and access to capital must be taken into account.

While the increased corn and cereals demand led to price increases for food in some developing countries, such as Mexico and Morocco, the EU and the US, as well as the countries concerned have taken a number of steps.

The EU’s adoption of sustainability criteria has been specifically designed to avoid competition with food and supports second generation/lignocellulosic biofuels development. However, the situation must be monitored carefully and food security should be of high importance. In extreme cases, governments should take appropriate measures to secure their food supply.

Though it has often been said that increased corn use for biofuels in the US would cause food shortages in Africa because of reduced stocks and exports, the facts show that the US corn exports, though less in 2006-7 than in 2005-6 are still above the average of the past ten years. It is also important to remember that most of the corn exported by the US is used for cattle feed, not human food in developing countries.

To put the impact of biofuels in perspective, it is expected that for 2008 the production of biofuels would require about 60 million tons of cereals versus a world-wide production of cereals well in excess of 2 billion tonnes. The increase in corn production of about 65 million tonnes in the US alone in 2006-2007 would be sufficient to respond to that need.

4. How does the increased biofuels production following on from the EU and US biofuel targets impact agricultural raw materials for industry?

The price of agricultural raw materials has risen and will rise further as a result of increasing demand from food, feed and fuel production. The question is “how much”?

Industries that use the same raw material as biofuels (parts of the food industry, chemical industry and forest-based industries) are most likely to be affected. This question has been the focus of a number of studies both in the EU and the US. The studies calculated that the expected price increase is very limited, especially considering the ambitious targets that have been set. Maize prices are expected to increase by 3-6% per billion gallon increase in the demand for corn ethanol in the US.

Estimates of the impact on wheat prices per billion gallon increase for ethanol range from a 0.6 to 2.1% increase. A 14% share of biofuels in the EU transportation sector would imply an increase in price of 6% for wheat and 13% for rape oil, but would cause the prices of rape meal and soy meal to fall by approximately 40%.

Overall, the studies indicate that price rises on agricultural raw materials for industry will be limited relative to the prices in force today.

5. Is biofuel production bad for the livestock industry?

Most production plants using biomass also produce co-products (dried distillers grains (DDGs) for bioethanol and press cake from oilseed rape for biodiesel) that can be used as feed. Using these by-products of the biorefinery, the price of feed derived from biofuels production (DDGS, rape meal, soy meal) are expected to decrease significantly.

Feed price derived from biomass used to produce biofuels are expected to decrease. DDGS = - 6% per billion gallon bioethanol; rape meal = - 42% for a 14% EU biofuel target, soy meal = - 39% for 14% EU biofuel target. These provide excellent high protein feed for cattle.
6. How can we meet today’s demands of fuel and food?

There are a number of ways we can meet the fuel and food demands today. Firstly, corn production in the US, by far the largest producer and exporter, has increased in 2007, from 265 million tons (2006) to 327 million tons in 2007, adjusting to the market demand and high prices\(^1\). In the past forty years yield of corn has steadily increased from about 4.5 t/ha to 9.4 t/ha in the US, and from 2.3 t/ha to 4.8 t/ha worldwide.

By 2015 yield in the US is expected by the National Corn Growers Association to further increase to 180 bushel/acre or 11.2 t/ha. More short term, for 2007-2008, the supply of corn is expected to be 700 million bushels (~17 million tons) more than the demand and there will be no corn shortage\(^2\).

In Brazil, a sugarcane improvement programme permits an increase of the production from less than 3.5 m\(^3\) ethanol/ hectare in 1975 to more than 6.5 m\(^3\) ethanol/ hectare in 2003\(^3\).

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References and Further Reading

2. The most feed efficient meat is chicken: 2.5 kg of feed = 1 kg of meat. Population of China is around 1.3 billion people. 1.3 million tonnes *2.5 = 3.25 million tonnes of animal feed.
tional_Data/Novozymes_Aug07.pdf
8. UN FAOSTAT 2005
10. USDA, Economic Research Service
12. US department of agriculture, UN/FAO and FAPRI
fuels_progress_report Annex_en.pdf
14. US DoA, UN/FAO, FAPRI, EC
17. USDA, PreExporter network
18. Centro de Tecnologia Canavieira

Other factsheets in the series available on: http://www.europabio.org/Biofuels/Biofuels_about.htm

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