Overview

Global Perspectives in Food and Agriculture

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Overview

Overview

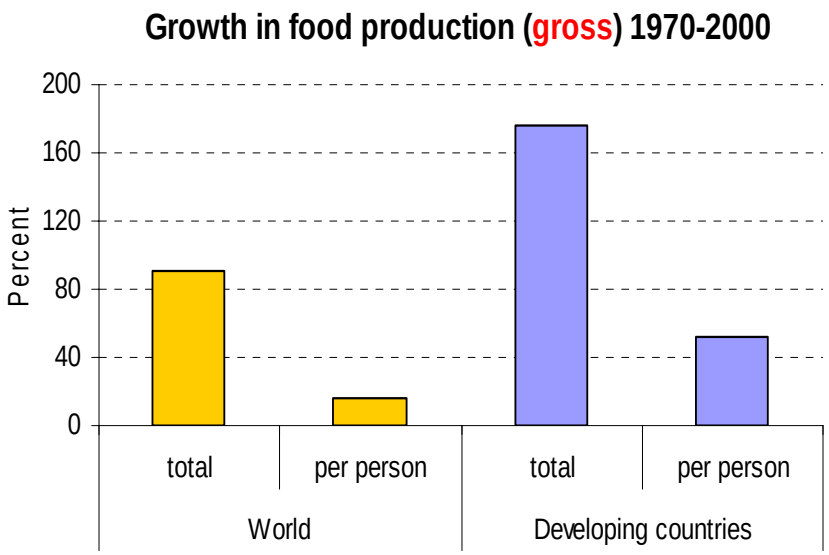
1. Food markets: where do they come from...
   ... and where are they headed for?
2. Non-food markets: How big is the potential, globally and regionally?
3. How does an increased use of bioenergy affect food prices and markets and ...

   ... how competitive are the various forms of bioenergy?
4. How does food-fuel competition and higher food and fuel prices affect international food security?

Looking back on past achievements

A. Looking back on past achievements

The benefits of modern agriculture have been immense…

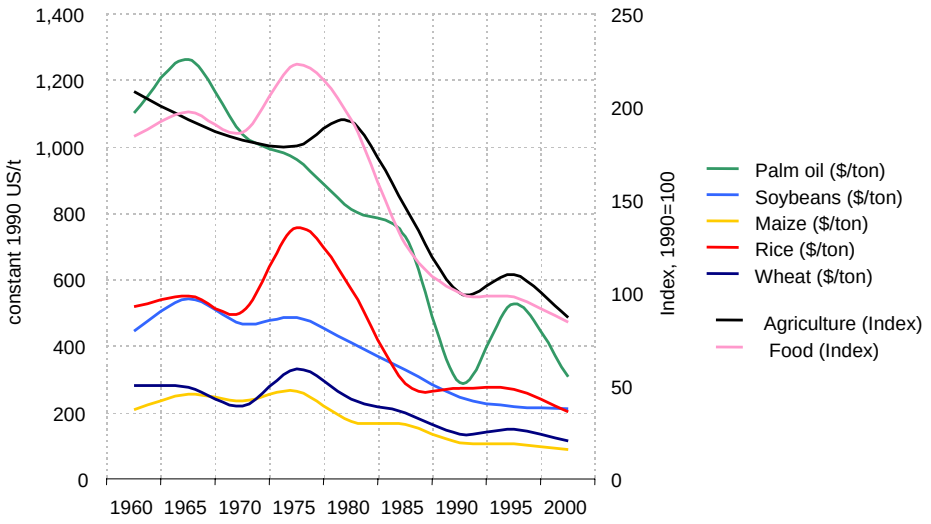


1. Globally, food production has doubled over the past 30 years, in developing countries it has nearly tripled. Note however that this is the increase in gross production, it includes losses and wastes and does not mean that food intakes have increased equally fast.
2. More importantly, food production has outpaced population growth. Food supply per person has increased by more than 15% in developed countries and 50% in developing countries.
3. The rapid output growth in developing countries is particularly remarkable. It has outpaced the much higher population growth compared to developed countries and resulted in a 50% higher level of production per person.
4. The rapid production growth was driven by technological progress and far-sighted investment in agricultural research. The fastest growth rates were achieved for wheat, rice and maize which, as the world's most important food staples, have been the major focus of international breeding efforts.
5. At the other end of the scale, however are a number of products that are most important for the poor like millet, sorghum and pulses where yield growth was much slower. In fact, there is a circular relationship insofar as agricultural production and productivity growth have helped to reduce hunger and poverty in a very substantial manner. And, where crops didn't benefit from technical progress, farmers remained poor.

Looking back on past achievements

Looking back on past achievements ...

A drastic decline in real prices for food and agriculture



Source: World Bank, "Pink Sheets"

1. Prices for food and agriculture have declined by around 60% in real terms over the last 40 years.
2. As farmers, you have witnessed (and suffered from) this development as your prices declined, particularly strongly with the inception of various rounds of reforms of the CAP that brought your own domestic prices in the EU quickly to or close to these world market prices (cereals, oilseeds, pig and poultry meat or eggs); not so yet for sugar, milk and beef, but this is more a question of time than a question of principle.
3. This has allowed to reduce the share of people suffering from food shortages by more than half (>35% to 17%); even in absolute terms the numbers have been declining (960 to 800 million in the developing world)
4. Lower food prices in conjunction with real in come growth has also enabled consumers in developing countries to embark
    - at much lower income levels on higher overall food intake levels, more calories in general
    - but also at a much lower income level at high intake levels for "high-end" food items, notably live stock products (average Chinese has more than 50 kg of meat available at less than a 1000 US$ at MERs)

Overview

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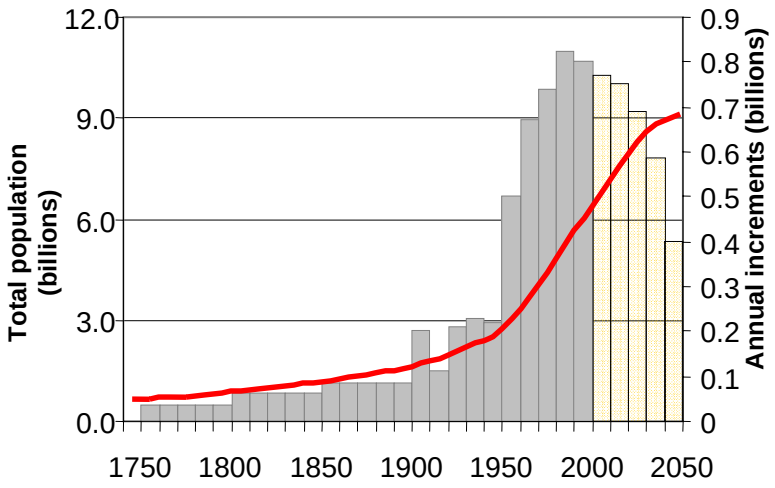
1. Food markets: where do they come from...

   ...and where are they headed for?

The driving forces of demand to 2030

Food markets: drivers of the long-term outlook

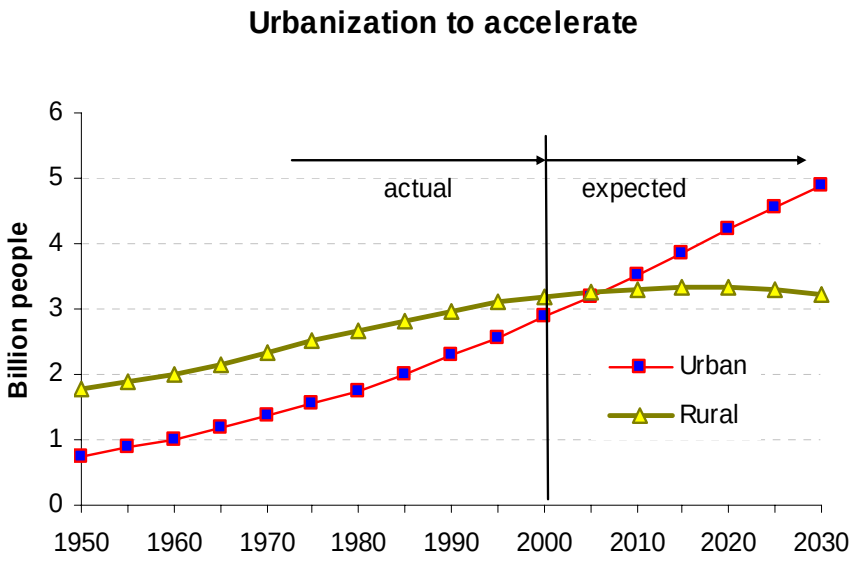
A drastic slow-down in world population growth



1. The population projections we take from the UN. The one we used in this round of work was the Medium Variant of the 2000 round of the UN demographic projections.
2. For every long-term outlook on global food and agriculture, population growth is the key driving factor. It is one of key drivers for longer-term demand. The dynamics creates its dynamics for food demand. It is, as we will see later, the main reason for a drastic decelerating in global agricultural supply and demand that we expect over the next 30years.
3. Pop growth peaked in the 1960s with developing countries reaching 2.5% p.a., this has declined to 1.5% currently, will further decline to 1.0% by 2030 and to 0.5% by 2050.
4. We are at a crucial (inflection) point in the long-term population growth, about a decade ago, the annual increments of the world population started to decline. This does not mean that population growth is over, far from it, but means that growth is slowing down and with a view to 2050, it is slowing down considerably.
5. The demographers who venture an outlook even beyond 2050 even suggest that there is a good chance that we reach a non-growing, steady state world population between 2050 and 2100, at a level of about 11-13 bn people. Within the 300 year time frame that we have in front of us, such a view point should be allowed. Within this time horizon, we are really close to an entirely new set of conditions for world agriculture, food and way beyond. For world agriculture, a steady state population would, amongst many other things, mean:
    - End of the treadmill to increase yields
    - Less pressure to encroach on new land,
    - Catching up in the race between population growth and food production, and the possibility to focus only on feeding the existing population better, and so on. But we are not yet there!
6. But within the next 30 years, there will still be a considerable increase of about 2.3 billion people. And let me now delve a little bit more into where these people will be living.

The driving forces of demand to 2030

Food markets: drivers of the long-term outlook



Source: UN, World Population Assessment 2002

1. World population will increase from 6.1 billion currently to 8.1 billion in 2030 (previously 8.3).
2. More than 100% of the growth is expected to take place in developing countries.
3. 100% of the growth will be urban.

→ Urbanization:

- → better infrastructure: roads, ports, cold chains
- → Proximity to consumers
- → More processed food, higher processing margins
- → More convenience food

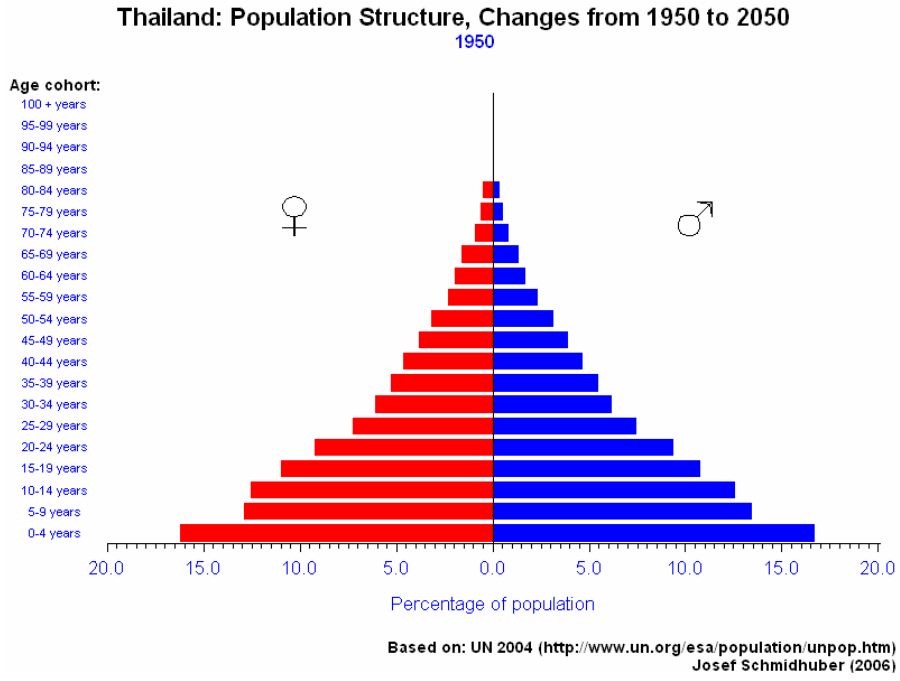
→ Change in food trade (imports)

→ Change in food diets, less roots and tubers, more meat, etc.

→ Sedentary lifestyles, 10-15% lower calorie expenditures: 2% error in the long-term energy balance leads to obesity!

The driving forces of demand to 2030

Food markets: drivers of the long-term outlook



1. Rapidly ageing populations will become a feature in many developing countries
2. Not very much empirical evidence on how this will affect consumption patterns directly, but as a higher percentage of the population is economically active, the overall ability of a population and an individual to purchase food will increase. And more meat and livestock products will be consumed per person.
3. Population dividend, i.e. higher incomes and higher consumption plus
4. Little emperor problem, 4:2:1 problem. Child obesity already in China, but increasingly elsewhere as fertility rates decline almost ubiquitously
5. The health problems are shifting from diseases that affect young populations (infectious diseases, typical children's diseases) towards non-infectious diseases that affect the population segments in adult age groups.

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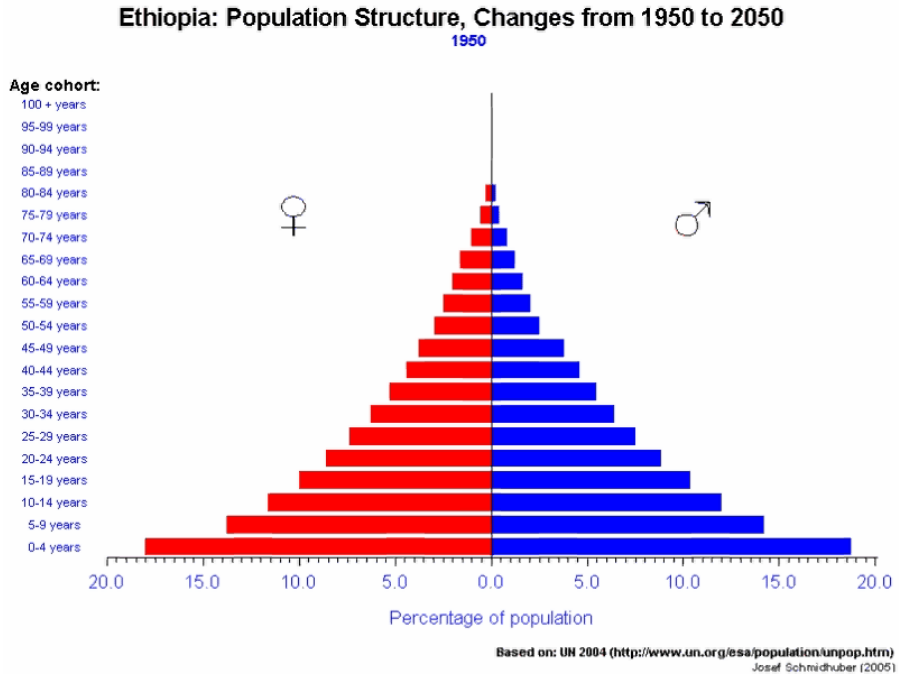

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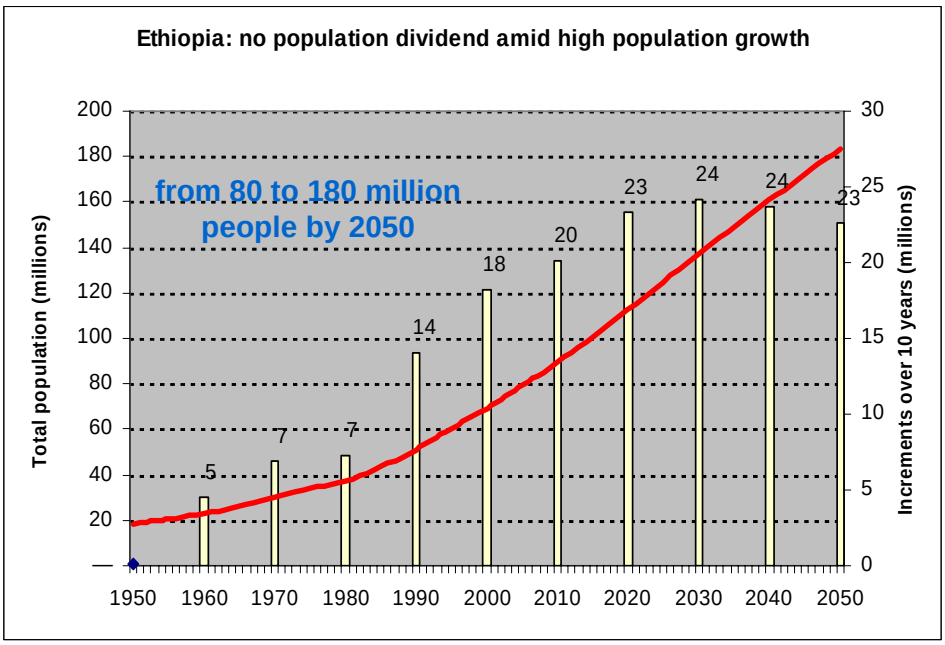

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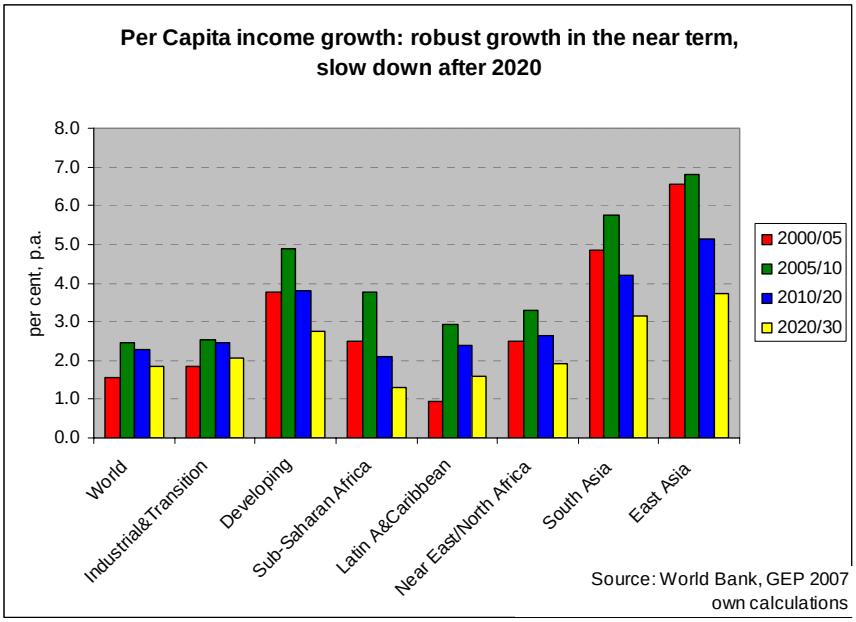
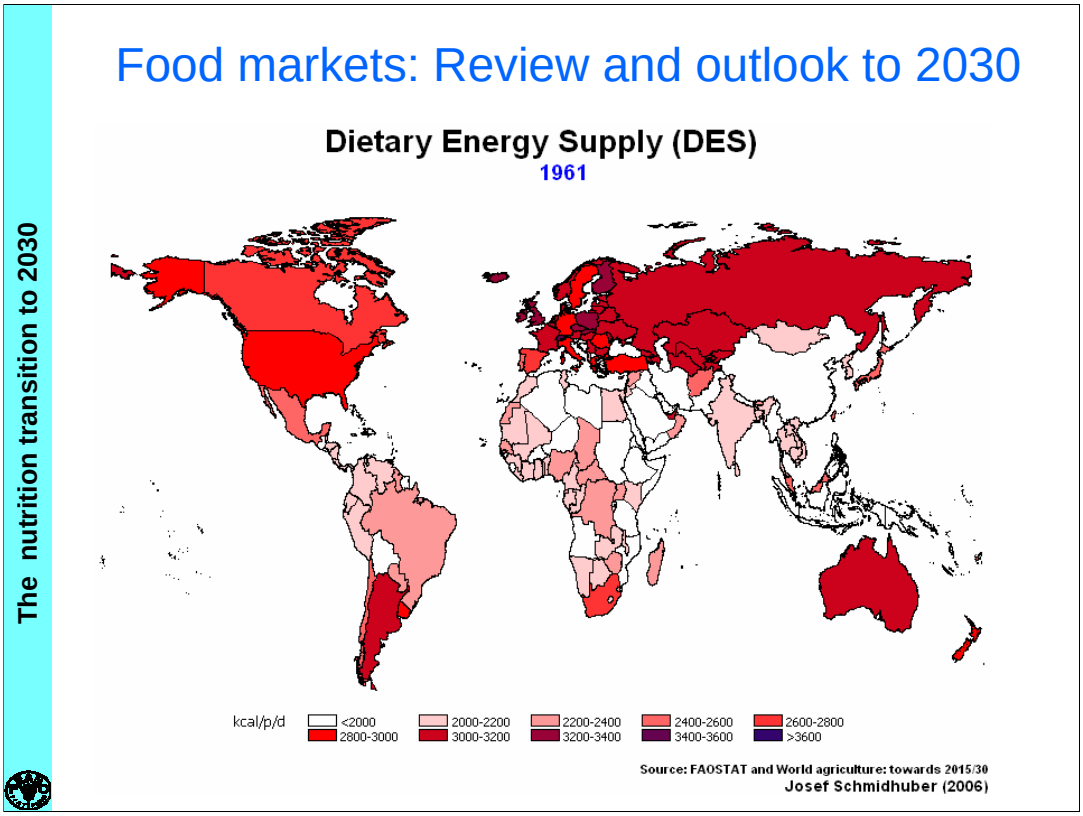


1. Prospects for further income growth in developing countries are very good for the group as a whole
    - Population dividend
    - high productivity growth
    - globalization and freer trade
2. But growth will be unequally distributed over regions and countries
    - While prospects have improved for SSAF and NENA, they are still considerably below growth expected for SASI and EASI.
    - Both NENA and SSAF benefit from the current commodity boom, NENA for hydrocarbon prices, SSAF from metals, oil and some agricultural commodities such as cocoa.
    - High in Asia, traditionally EASI but increasingly also in SASI
3. High incomes will accelerate energy demand and food demand. As we will see later, higher energy prices will drive agricultural prices up to their energy price equivalents.



60s: Widespread calorie deficits and hunger in essentially all developing countries (exceptions Argentina, RSA).

Asia: Famine in China 40 million causalities, famine in India, undernourishment in much of LA (Bolivia, but also Brazil). All population giants (India, China, Indonesia, Brazil) with substantial calories undersupplies.

Africa: The entire continent is affected, including the North African regions as well as the near East. This will change in the 1970s (oil windfalls)!

Industrial countries: Many approach the 3000 Kcal threshold. The richer ICs (USA) have exceeded it, the poorer ones (GRE, POR, SPA, etc.) are still around 2400-2700 kcal. But they will face the fastest transition, to be observed from under to oversupply !

70s: ICs move ahead, many now exceed the 3000 kcal level, growing overweight and obesity problem

LDCs: Mid-late 70s: The impacts of Green Revolution become visible in the FBS of many Asia countries, including the population giants India and China. Also improvements in LA. NENA becomes completely different from SSAF. No progress in SSAF, remains the hunger continent for the next decades, in fact, we expect that to continue into the next 2 decades at least.

80-90s: Obesity problems gather pace in ICs, USA and other Anglo-Saxon countries take the lead, DES levels increase to 3600-3800 kcal, prevalence of obesity approaches and exceeds the 30% mark.

LA: progress across the board. Bolivia lagging behind but countries like Peru making remarkable progress

Food revolution in China: massive reduction in the prevalence of undernourishment, below 10%, hunger becomes less of an availability problem (i.e. production problem) than an access problem, i.e. a hunger problem. We expect this to be a harbinger for many other countries in the regions, in fact for essentially all countries except countries in SSAF. This of course will have to change our hunger strategies, away from the traditional “productionist’ approaches (SPFS, AHP) towards the access based strategies.

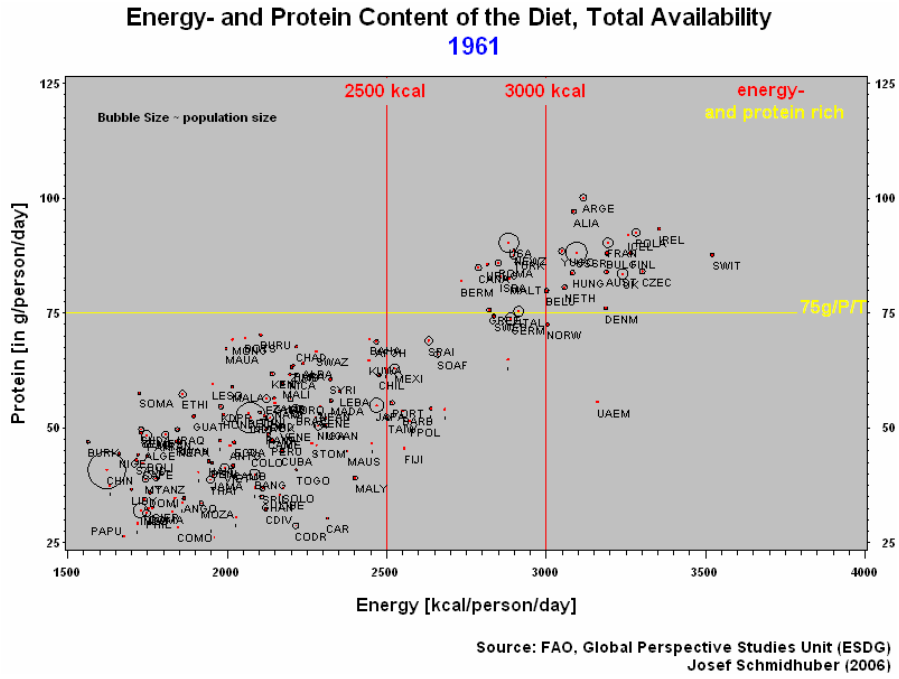
sub-Saharan Africa: No progress, or the opposite, creation of a “drought-HIV/AIDS-war” belt in southern Africa. Will remain a problem in the future. Region for agricultural-production first strategies also in the future.

Other, small parts of SSAF have made some progress, notable some West African countries like Ghana, Nigeria, while there is standstill or regress in Liberia, Mali, Niger, Burkina Faso, Côte d’Ivore, etc.

2000-15/30: progress to continue, in all DCs, except SSAF. Some SSAF with moderate gains. Asia and LA: many countries could face a growing obesity problem, many countries including big ones like China well beyond the 3000 kcal mark. Middle income DCs to move faster into the obesity columns: Real income effect makes more and better food affordable at much lower income levels, mechanization, transportation, urbanization reduces calories expenditure, all this could lead to an acceleration of change in consumption patterns and nutritional problems. What policies do we have to avoid such an outcome without compromising the fight against hunger??? Hunger is becoming increasingly a demand or access problem, less a supply or production problem, except for SSAF. With growing purchasing power of food and rapid urbanization the next step could be from overcoming access-related hunger problems into over-consumption and obesity/overweight and NCD problems

The Outlook to 2030: The nutrients

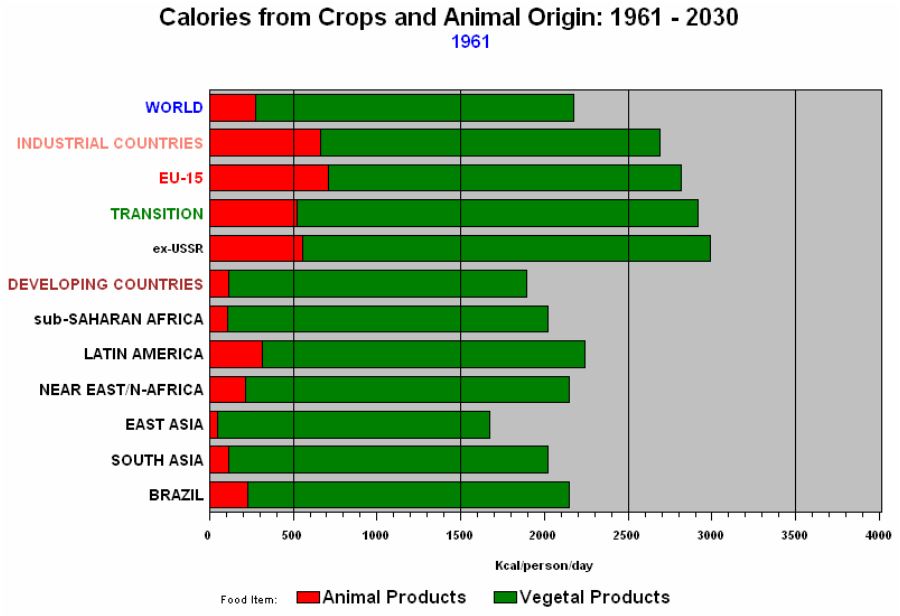
Food markets: Review and outlook to 2030



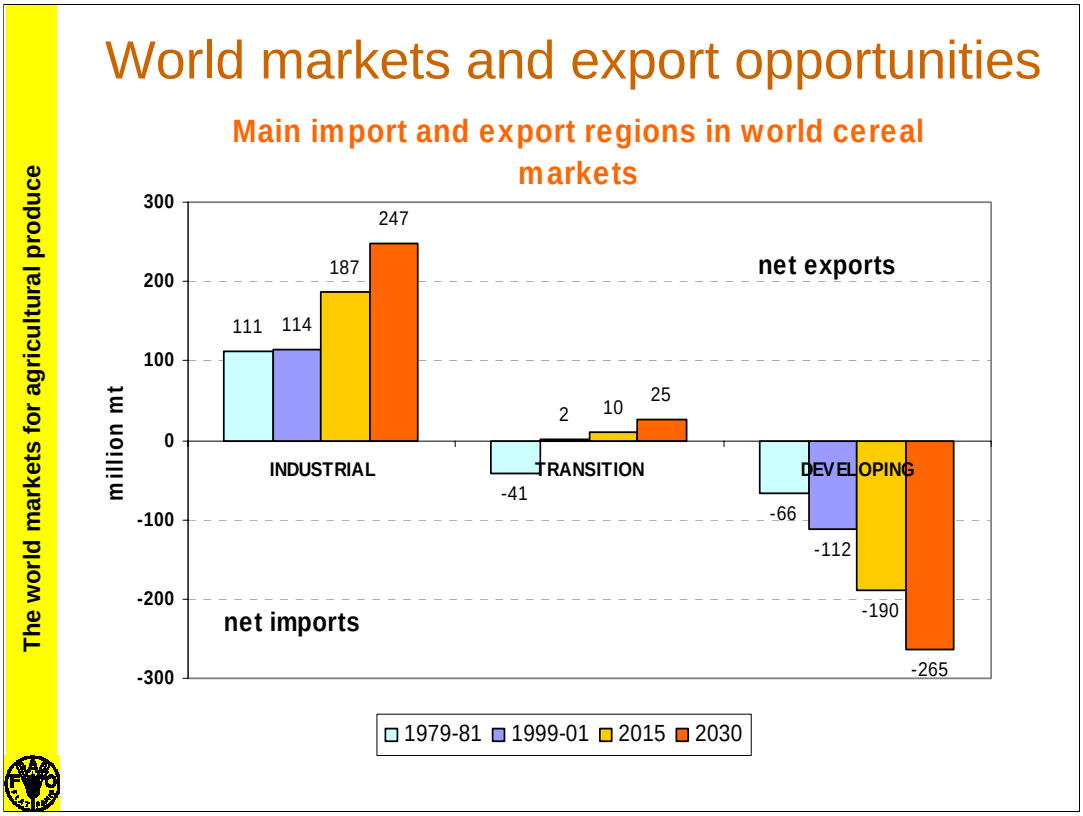
1. The dichotomy and the nutritional transition in a different display:
   - Lower left corner: Hunger and undernourishment: all developing countries
   - Center: very few countries, high income developing, low income industrial countries
   - Upper right corner: richer industrial countries
2. Past 40 years: cloud moves into the center at a growing speed
3. Next 30 years: speed accelerates and the picture reverses: all countries except for the SSAFs are in the upper right corner.

Food markets: Review and outlook to 2030

The nutrition transition to 2030



- **1960s**:
  - •Still a fairly heterogeneous group of countries:
  - •Considerable differences in the total DES
  - •Considerable differences in the share of vegetal and animal products, many developing countries get only few calories from animal products (meat)
- **mid 1970s:**
  - •Group becomes much more homogeneous in terms of total calorie availability, all countries around 3000 kcal/person/day
  - •… but still large differences in the level animal products. Many developing countries have been lagging behind. Livestock products are still expensive goods and growth in calories availability takes largely place through higher consumption levels of vegetal products. As we will see later, this diet was also characterized by superior health quality
- **mid 80s to 2000:**
  - •Further increases in the DES. Some giant countries like China experience particularly high growth including consumption of animal products
  - •Other regions continue to lag behind, notably sub-Sahara Africa. Demand for Livestock products is still income responsive.
- **today:**
  - •Saturation levels have been reached both on the DES and the livestock side in large parts of the developed world and increasingly also in the mid-income developing world. This is expected to continue to 2030.
  - •In fact, consumption of meat and other livestock products may have reached too high levels, resulting in high intake levels of saturated fats and cholesterol. This will be discussed in detail at a later stage.
  - •Challenge today: unwind the high livestock consumption levels, define and find back to a healthier food consumption pattern.



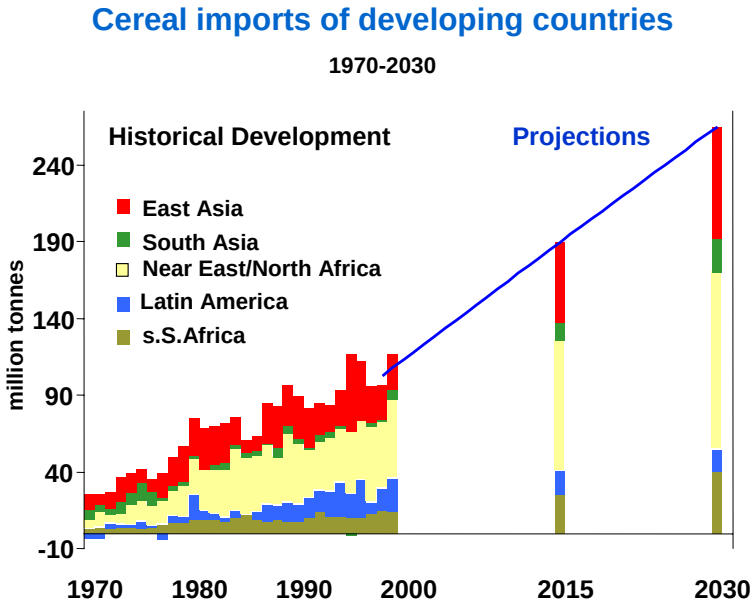
Trade

1. Let me first emphasize that the developing countries will cover the largest part of their consumption from domestic production. How much depends on the product. For cereals for instance their SSR will decline by only 5% from currently 91 percent to 86% in 2030. (2030: for wheat it is much less for 75% for rice more than 100%) [Meat SSRs are closer to 100%, even though imports rise sharply) . For dairy, the SSRs remain at about 91%, but consumption grows so imports grow in absolute terms.
2. But trade will account for a growing share of their consumption, and as consumption grows in parallel, imports in will absolute terms will rise considerably.
3. But growing overall consumption means that DCs will become growing importers in absolute levels, even where SSR remain the same. By 2030, DCs will import about 265 million tonnes of cereals.
4. Most of the needs (245 out of 265) will come from IL.
5. However, a growing share will also come from transition economies. In fact, the most recent developments indicate that there is a considerable risk that we have underestimated the production and export potential of transition economies. On most recent trends they may reach the target of 25 mmt of net exports much earlier.
6. BTW, also the EU may have underestimated this potential and has in fact become the most important destination of feed wheat exports from transition countries (black sea). New import regime with a TRQ of about 2.9 mmt to get a better handle on these imports as the current trade regime only allowed to protect against high-priced US supplies, not against cheap feed wheat supplies from black sea countries (Ukraine, Russia).
7. But we may underestimated the cereal production potential of a number of transition economies, particularly for feed wheat. Kazakhstan, the Ukraine and Russia have recently made considerable inroads into the world wheat market, challenging the EU at home and – possibly in the near future also abroad. On a net basis, the region is exporting currently (2203/03) about 20 mmt of wheat (27mmt cereals), compared to zero net exports only 3 years ago (-2 for cereals). This poses a number of questions.

- How sustainable is this increase in exports?
- Where are the main markets for these exports in the future? The EU has been a major buyer of feed wheat over the last 2 years (in fact made itself the largest wheat importer world-wide. But now pressure is mounting to put at least measures in place that will allow the EU to ward off competitive supplies from these countries: TRQ of 2.9 mmt. The current system didn't work as it was based on a high reference price in the US which made the maximum tariff to be applied very low, too low for wheat from EEurope.
- Will there be retaliation from Eastern Europe. Russia has now (in response to the TRQ from the EU) instituted a TRQ on beef. Still above current import levels but that could change.
- If the cereals are not getting into the EU market, where will it end up? In traditional EU markets, like Near East/ North Africa region?
- In any case, these additional supplies together with a unprecedented supplies from stocks have kept a lid on world prices for cereals. The question there is how stable is the situation if there in case of an unprecedented production short-fall.
- What policy measures will this trigger? Russia has already reacted with a TRQ on various meats potentially causing problems for EU beef, pork and poultry exports and raising stakes of a new and broader-based trade conflict in the WTO.

World markets and export opportunities

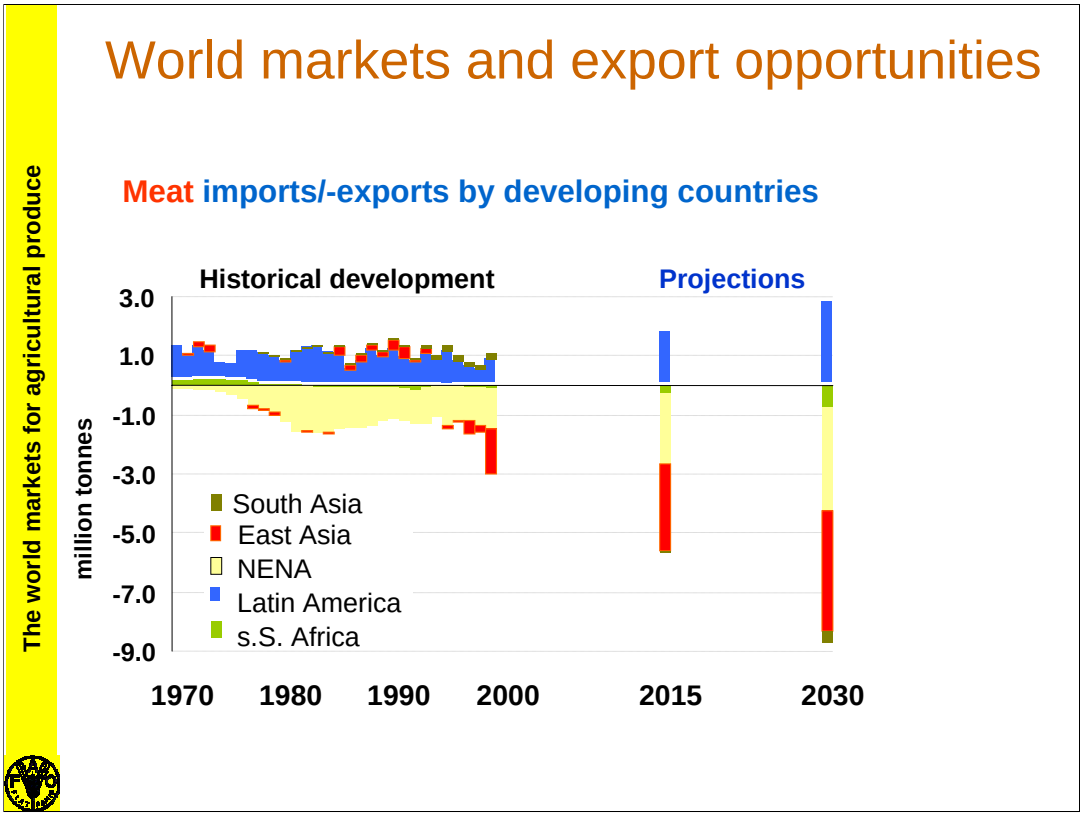
The world markets for agricultural produce



Let‘s have a quick look at where – within the developing world – the most important markets are likely to emerge.

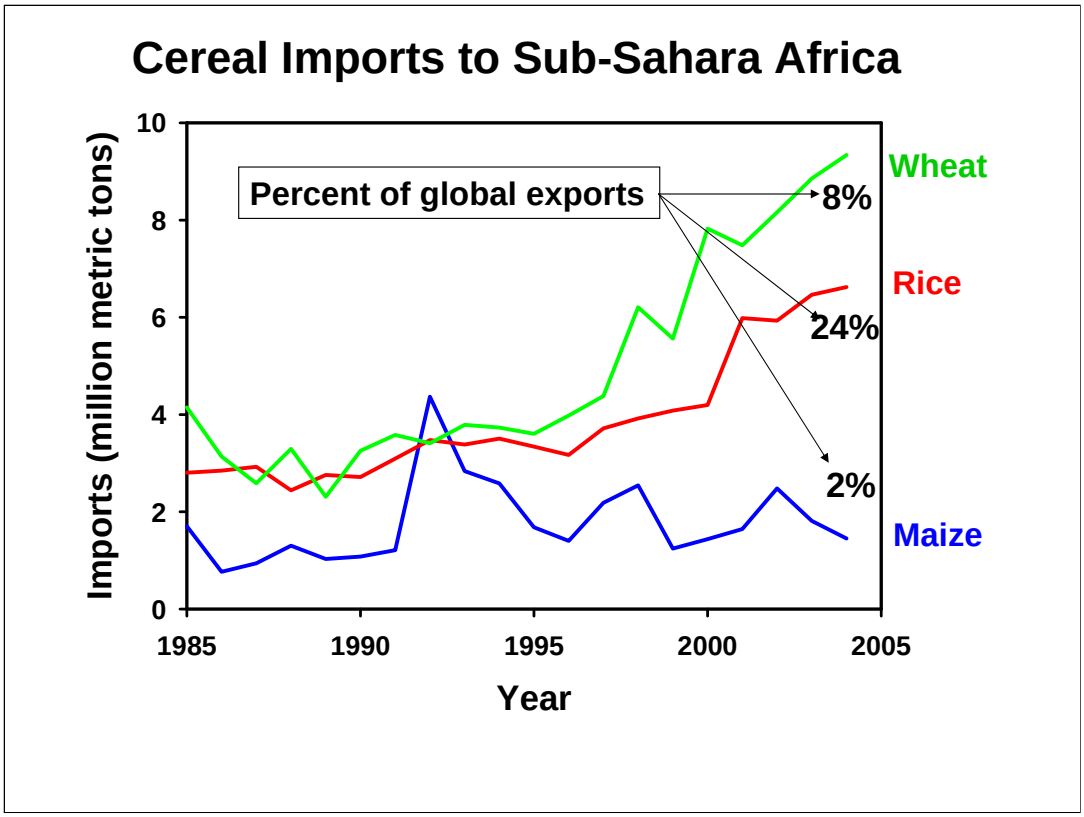
For cereals, Near East/North Africa will remain the most dynamic region:

1. Natural resource constraints to expand production (water)
2. Oil dollars to buy grains rather than produce domestically
3. Grain eating areas and consumption subsidies keep demand levels high (savings potential in the future). IRAN e.g. could reduce imports by half if prices would increase to world market levels (at the retail level for making bread); currently only 25% of world price; savings potential 4-5 million tonnes only by adjusting the prices (even assuming a low price elasticity; (12 million tonnes consumption)
4. Annual changes in NENA can be considerable
5. Traditionally an interesting market for Europe, but new opportunities for transition economies. Proximity.



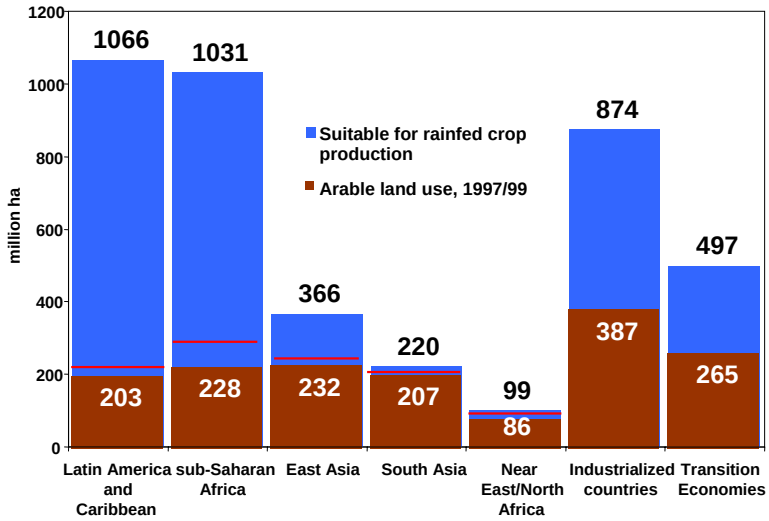
Where will all the meat go to?

1. The traditional market of NENA will remain the key import market. In addition, East Asia will remain an important meat importer, while Latin America is expected to further increase its meat imports. Poultry meat will be the preferred meat for a number of reasons.
    1. It is the preferred meat from the consumers view point. Low Cholesterol, low price, high convenience
2. Again, largely left out of the markets is much of sub-Saharan Africa, which lacks essentially all important preconditions to enter the market. There is not only a lack of income, but also a fundamental lack of infrastructure.
3. Also south Asia (India, Pakistan) remain low in both consumption and imports, but this is largely due to cultural and religious reasons.


Cereal Imports to Sub-Sahara Africa
Imports (million metric tons)
10
8
6
4
2
0
1985
1990
1995
2000
2005
Year
Percent of global exports
8%
24%
2%
Wheat
Rice
Maize

The resource base

Land in use versus suitable area for crop production

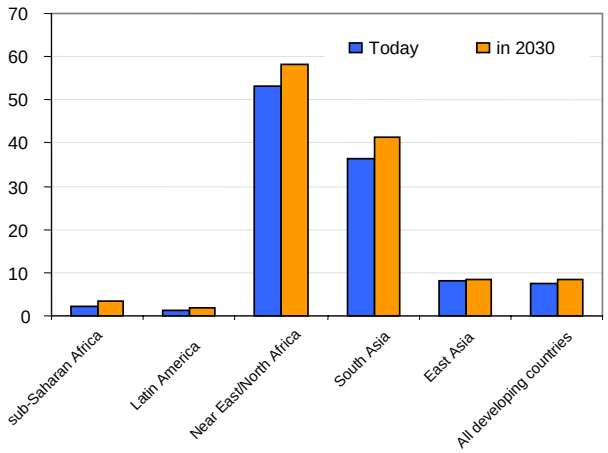


1. There is still potential agricultural land that is as yet unused. At present some 1.5 billion ha of land are used for arable and permanent crops, around 11% of the world's land surface.
2. Less new agricultural land will be opened up than in the past. Over the period 1961-63 to 1997-99 the expansion of arable land in developing countries totalled 172 million ha, an increase of 25%. In the next 30 years, an increase of only 120 million ha, or 13%, will be required.
3. While there is enough land globally, there is (and will be) local and regional land scarcity. Near/East-North Africa and South Asia are and will be the regions most affected by land scarcity.

The resource base

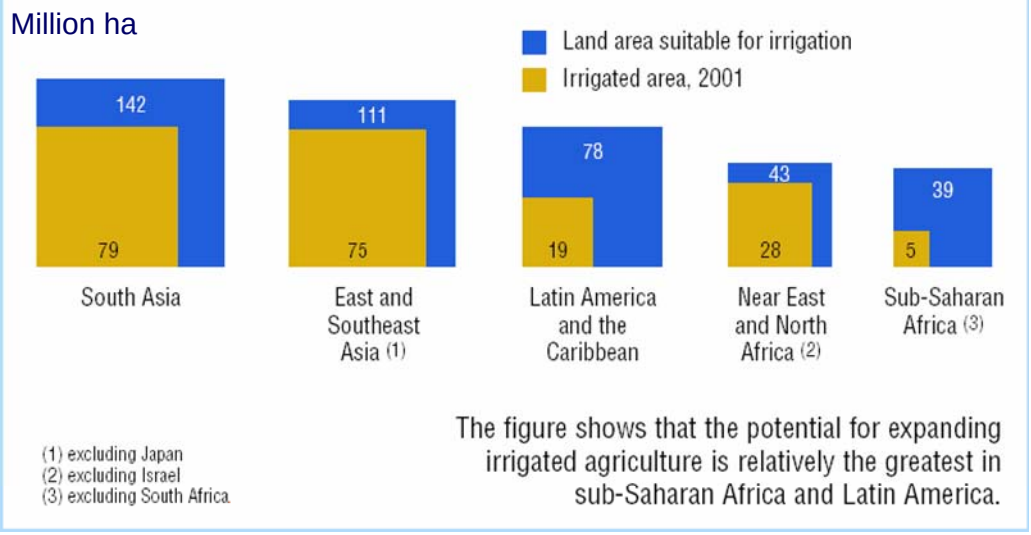
4. What challenges for the resource base?

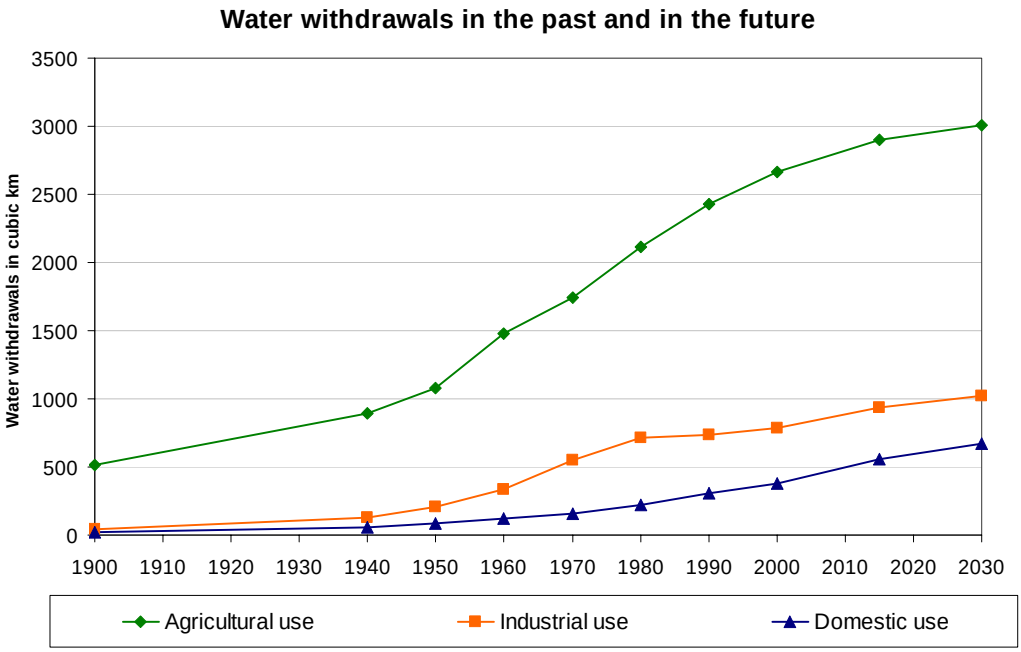
Irrigation water withdrawal as a share of renewable water resources (%)



1. Agriculture is the most important user of water. It accounts for more than 70% of total water withdrawals.
2. Irrigated area is a key contributor to agricultural production. It accounts for 20% of the land in developing countries (rice), but for 40% of the output and 60% of cereal production.
3. Only about 7% of renewable water resources in DCs were withdrawn for irrigation in 1997-99. 2% in sub-Saharan Africa, 1% in water-rich Latin America, but 36% in South Asia and 53% in Near East/North Africa.
4. The importance of irrigation is expected to increase further in the next three decades. Based on the potential for irrigation, national plans for the sector and the moisture needs of crops, the developing countries as a whole can be expected to expand their irrigated area from 202 million ha in 1997-99 to 242 million ha by 2030
5. Although the projected expansion is ambitious, it is less daunting than what has already been achieved. Since the early 1960s, no less than 100 million ha of new irrigated land have been created. The net increase projected for the next three decades is only 40% of that. The expected annual growth rate of 0.6% is less than a third of the rate achieved over the past 30 years.

Irrigated area and land suitable for irrigation
(as at 2001)





Source: Figures before 2000: Shiklomanov, 1999. Figures of 2000 and future projections: FAO/NRLW, 2007

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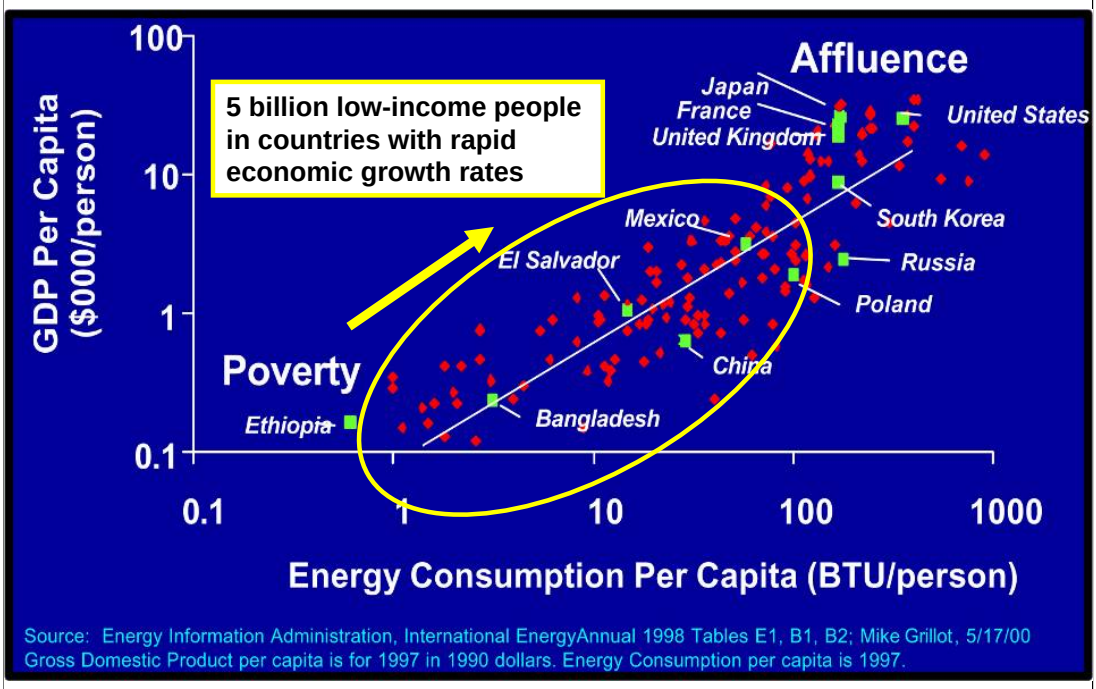
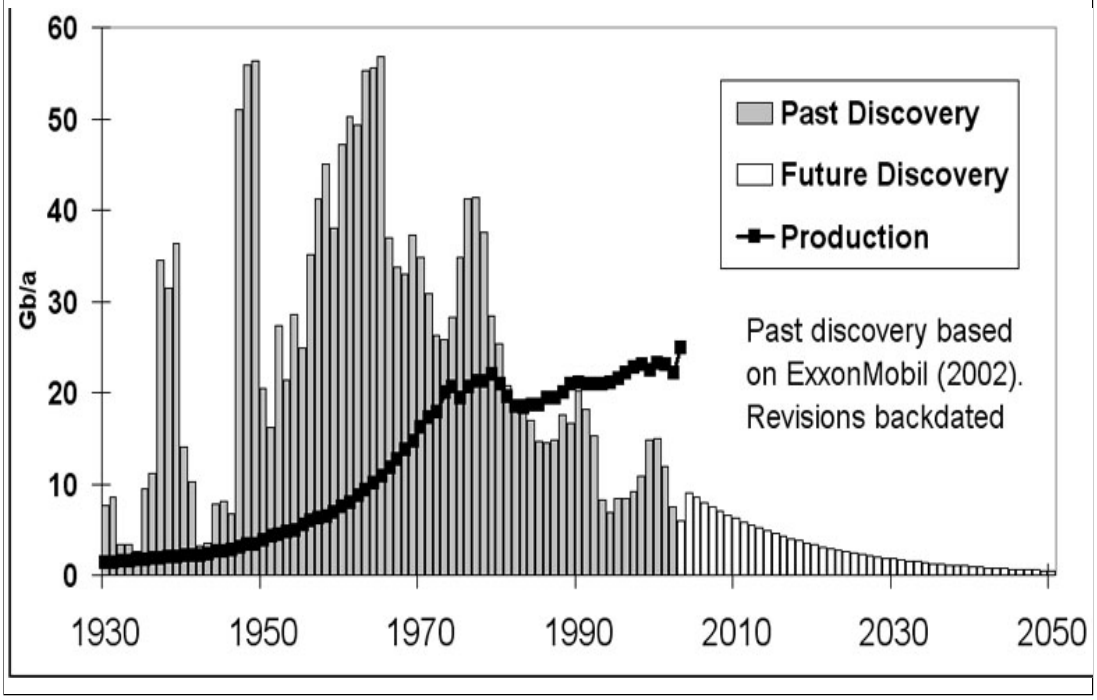
2. Non-food markets: how big is the potential, globally and regionally?

Energy Consumption and Income are Linked



Oil Production vs Oil Discovery



The potentials

How big is the market for biofuels?

Energy production and potential, biofuels and land use

			Exajoule (10^{18}), EJ[9]			million ha
Energy source		Year	World	OECD	non-OECD	World
All sources (TPES)		2004[2]	463	231	232	
		2030[2]	670			
		2050[2]	850			
Biomass	Actual use	2004[2]	32.5[11]	7.8	24.6	
	Theoretical potential		>>2000	Global photosynthesis: ~ 4000 EJ		
	Technical potential	1990[1]	225			
		2050[1]	400			
	Economic potential	1990[1]	89			
		2050[1]	158			
Biofuels	Ethanol[7]	2004[3]	0.84	0.34	0.51	9.52[4]
	Biodiesel[7]	2003[3]	0.06	0.04	0.02	0.47[4]
	Potential[1]	2050[1]	53[10]			
			million ha			
Agricultural land[8]	Used	1997-99	1506	658	848	850[4/5]
	Total suitable		4188	1406[6]	2782[6]	(4730)

1.) Potential based on Schrattenholzer and Fischer, IIASA, 2000
2.) Based on IEA: Key energy statistics, 2006
3.) Derived from http://www.earth-policy.org/Updates/2005/Update49.htm, Earth Policy Institute
4.) Assuming an average yield per hectare for ethanol of 4200 l (3000 l US maize, 5500 l Brazil cane, 6900 l France sugar beet) and of 3800 l/ha for biodiesel (average). Most recent yields are about 10% higher for cane and 20% higher for maize.
5.) 850 million ha would be required to meet today's transport fuels needs (77 EJ) at current yields (l biofuel/ha), technology, and crop composition.
6.) Area for developing and developed countries, not OECD and non OECD
7.) Assuming an energy content of 34 MJ/l for biodiesel and 21.1 MJ/l for ethanol
8.) Bruinsma (ed), World agriculture: towards 2015/2030, An FAO Perspective, 2003, total suitable land for rainfed agriculture
9.) 23.8845 Mtoe = 1 EJ
10.) IEA (2003), "Biofuels for Transport", table 6.8.
11.) 15-60 EJ: most biomass fuels are not traded on world markets, estimates of consumption are highly uncertain.

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How big is the market for biofuels?

Energy production and potential, biofuels and land use

		Exajoule (10^{18}), EJ		
Energy source:	**Year**	**World**	**OECD**	**non-OECD**
All sources	**2004[2]**	**463**	**231**	**232**
	2030[2]	**670**		
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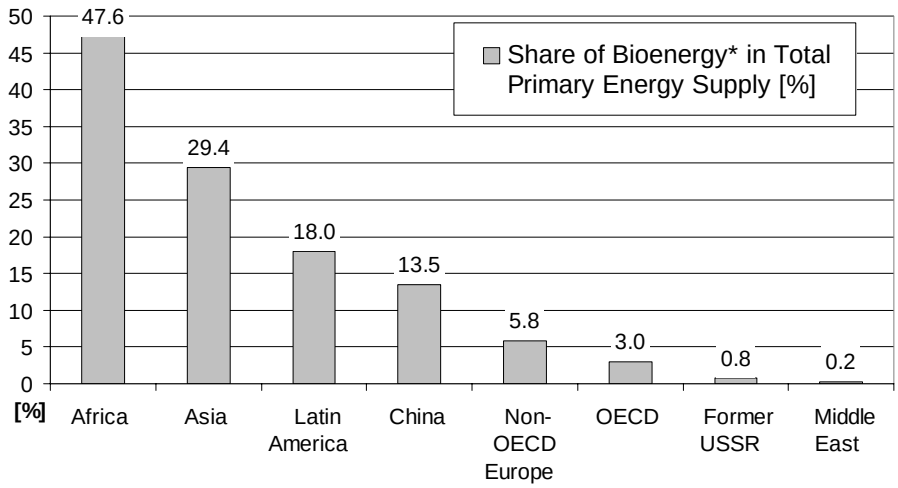
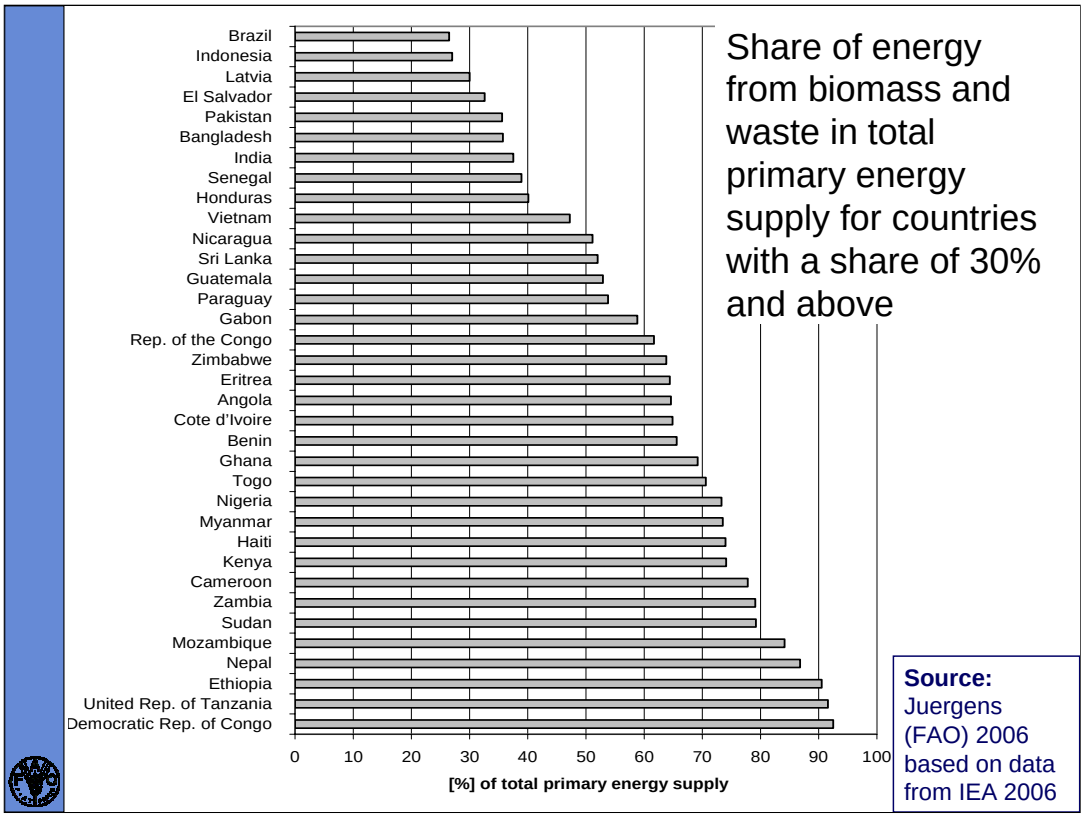
Bioenergy supply in 2004 (according to IEA 2006)



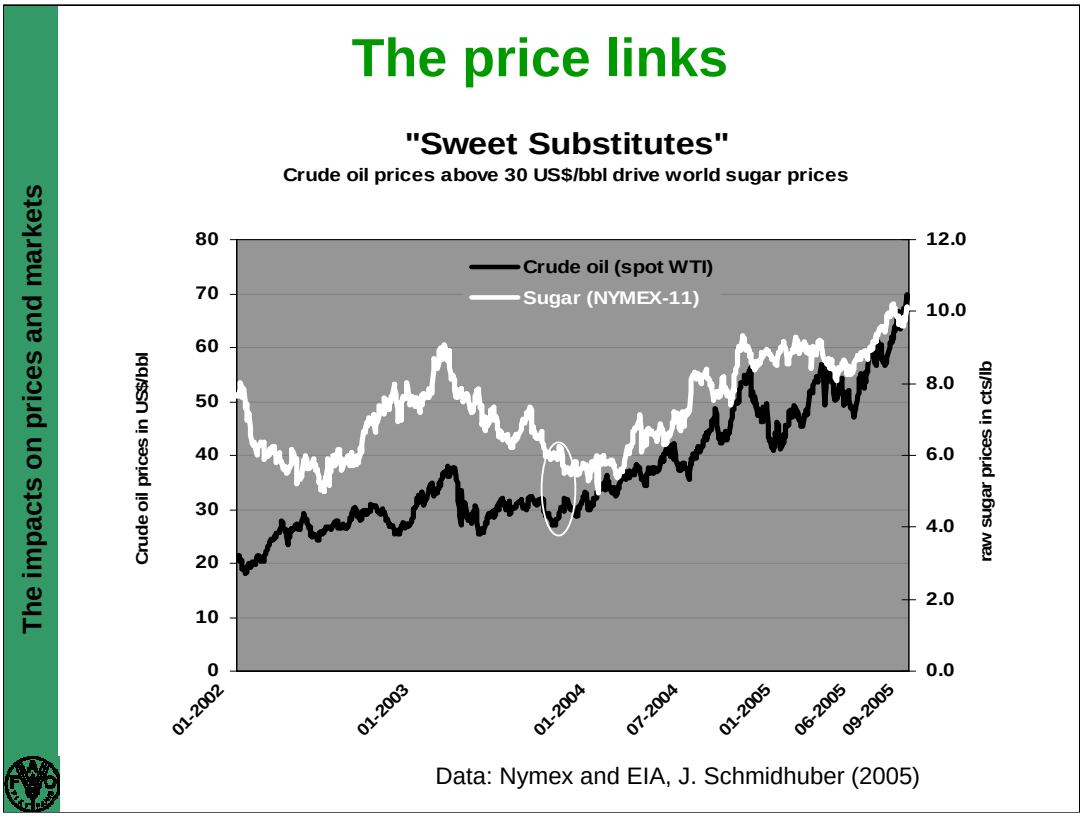

Brazil
Indonesia
Latvia
El Salvador
Pakistan
Bangladesh
India
Senegal
Honduras
Vietnam
Nicaragua
Sri Lanka
Guatemala
Paraguay
Gabon
Rep. of the Congo
Zimbabwe
Eritrea
Angola
Cote d'Ivoire
Benin
Ghana
Togo
Nigeria
Myanmar
Haiti
Kenya
Cameroon
Zambia
Sudan
Mozambique
Nepal
Ethiopia
United Rep. of Tanzania
Democratic Rep. of Congo
0
10
20
30
40
50
60
70
80
90
100
[%] of total primary energy supply
Share of energy from biomass and waste in total primary energy supply for countries with a share of 30% and above
Source: Juergens (FAO) 2006 based on data from IEA 2006

Overview

Overview

1. Food markets: where do they come from and where are they heading for?
2. Non-food markets: How big is the potential, globally and regionally?
3. How does an increased use of bioenergy affect food prices and markets and ...

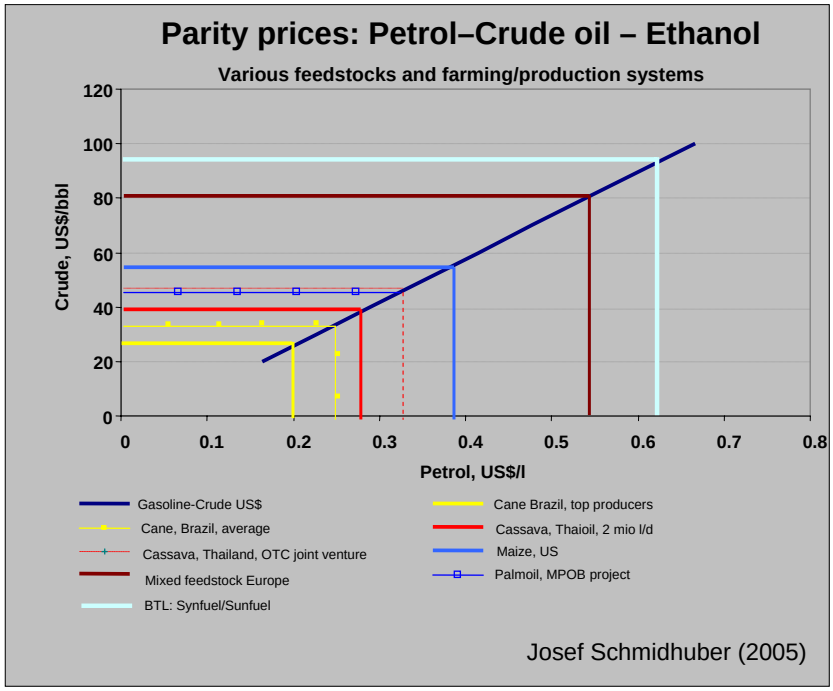
   ... how competitive are the various forms of bioenergy?



1. Traditionally, our analysis of links between energy markets and agricultural markets was through the input side, i.e. how do high/low energy prices affect prices for fertilizer, pesticides and diesel. This is of course still and issue, but not for the presentation today. A more recent and I venture to say a more important link has now occurred on the output side, as energy prices have a direct impact on agricultural output prices.
2. Ever since oil prices broke thru the US$30/bbl mark in Jan 2004, oil and sugar prices move up in tandem (the importance of the 30 dollar mark also in May 2003.
3. The main reason is that Brazilian Ethanol producers become competitive in producing ethanol, a direct crude oil substitute at the US$30/bbl without requiring subsidies or rebates on fuel excise taxes. As Brazil started to shift at this price level out of sugar and into ethanol, sugar prices went up, they went up pari passu with oil prices.
4. As sugar prices go up in Brazil, sugar prices go up on the world market. This entices farmers in other countries to produce more sugar and less of other crops and thus lifts prices for all other crops as well. Of course only in countries that produce at world prices benefit from this effect.
5. In effect, the oil price of US$ 30 per bbl introduces a floor price for other agricultural produce. This general floor price effect is caused by the fact that the market for energy is large relative to the agricultural market, demand is for all practical purposes, perfectly elastic and because all other crops and products are indirectly competing for land as a scarce resource. This also holds for animal products, but more for pigs and poultry than for beef, milk and mutton, which are less dependent on land as a factor of production.
6. The parity price analysis in the next slides will show that sugar price may even have some room to go up (some 20%), should oil prices remain high. A number of factors limit the instantaneous price transmission (limited blending capacity for ethanol, limited number of FFV, etc.
7. As I predicted in the GEWISOLA conference, the parity price of sugar at US$60/bbl should be around 13ct/lb, and since then, we have indeed seen an increase to 12.3 cts/lb. An opportunity to make money!

The competitiveness

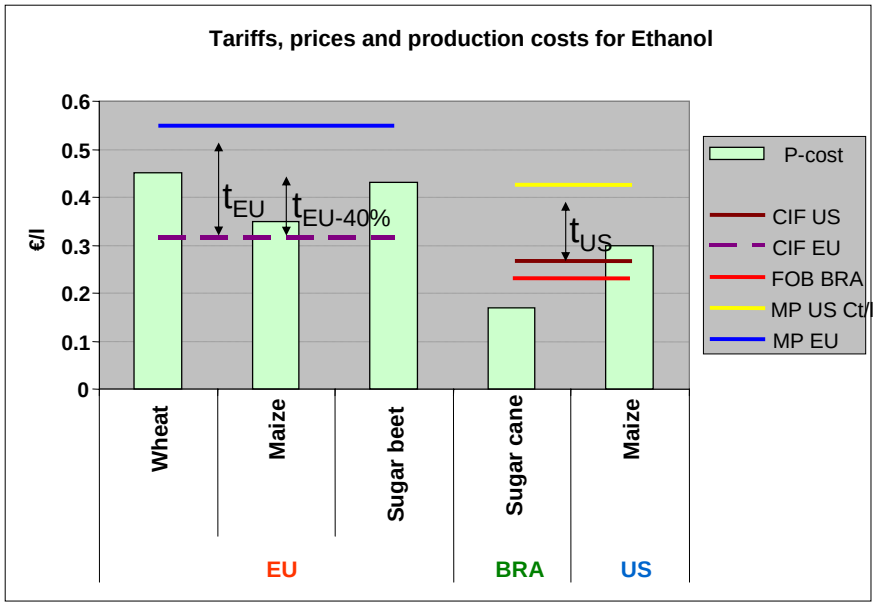
Competitiveness by feedstock



1. Eine der Zentralen Fragen ist wie wettbewerbsfähig sind Agrarrohstoffe für die Energienutzung, ab welchem Preis, in welchem Produktionssystem und fúr welchen Verwendungszweck.
2. In dieser Graphik sind ein paar Beispiele zusammengefasst. Auch wenn sie nicht repräsentativ sind, so stellen so doch eine Auswahl an im Augenblick relevanten Verfahren und Rohstofftypen dar.
3. Die Diagonale bildet den Gleichgewichtspreis zwischen Rohöl und Benzin, wobei hier eine relative enge Raffinations-, Transport, und Lagermarge von ca. 6US/ bbl unterstellt wird.
4. Die vertikalen Linien sind entsprechend die Gleichgewichtspreislinien für Benzin.
5. Wie man sieht sind die wettbewerbsstärksten Agrarprodukte– und produktionssyteme bereits ab ca 25US$/bbl wettbewerbsfähig. Die ist der Fall für die Topproduzenten in der Region Center-South in Brasilien Allerdings ist hier zu beachten, dass sich die Paritätspreise auf das Jahr 2002/03 beziehen und damit auf wesentlich billigere Wechselkurse des Real. Heute ist durch die Aufwertung des Real der Gleichgewichtspreis um ca 10-15 US$ höher an zu siedeln.
6. Kurze Diskussion der einzelnen Linien und Produktionsverfahren.
7. Wie wurden diese Preise errechnet?

- Sie Paritätspreiseberechnungen beginnen mit der Berechnung der Totalen Produktionskosten für einen Liter Ethanol. Die Hautelemente dabei sind die Kosten für das Rohmaterial (feedstock, ab Hof); dazu kommen die Kosten für Transport, Verluste, Arbeit, Lagerhaltung, Konversion. Dazu kommen die anteiligen Kapitalkosten für die Konversionsanlage also Zinsen und Aschreibungen. Nicht enthalten sind die branchenüblichen Profitmargen von 15-30%.
- Die Gesamtkosten werden dann umgerechnet auf das Energieäquivalent, bei Ethanol sind das 68.5%.
- Schließlich werden die Rohölkosten auf die Benzinkosten umgerechnet, wie bereits gesagt mit einer Marge von 6US$/bbl.

Are EU tariffs on ethanol high enough?



Eines der großen **Risiken** ist die Politikabhängigkeit der Rentabilität der Bioenergieerzeugung

Abgebildet sehen Sie hier die Produktionskosten, die Weltmarktpreise und die Binnenpreise sowie die Zölle die gewährleisten, dass sich die Binnenpreise über dem Weltmarktniveau halten.

Wie Sie sehen, reichen die Zölle im Augenblick gerade noch aus um die Binnenpreise über den Produktionskosten zu etablieren.

Sollten aber z.B. die WM Preise für Ethanol fallen (z.B. mit fallenden Ölpreisen) oder die Zölle für Ethanol gesenkt werden (wie in der Doha Runde vorgeschlagen), dann sollten die Preise schnell unter die Produktionskosten fallen. Angesichts des hohen Kostenanteils der variablen Kosten kann es dann schnell zur Unterschreitung der kurzfristigen Produktionsschwelle kommen. D.h. Es wird dann wirtschaftlicher die Produktion kurzfristig ganz einzustellen, mit entsprechenden Auswirkungen auf die Märkte.

The impacts on prices and markets

Cross links: Impacts on international commodity prices

	An additional 10 million tonnes of …				
	Sugar	Maize	Sugar and Maize	Soybeans and Maize	Sugar, Maize and Soybeans
Corresponding energy [biofuels]	0.195 EJ	0.087 EJ	0.282 EJ	0.167 EJ	0.349 EJ
Commodity	… used for biofuels would change international prices (percent) in the long-run by :				
Sugar	+9.8	+1.1	+11.3	+2.3	+13.8
Maize	+0.4	+2.8	+3.4	+4.0	+4.2
Vegetable oils	+0.3	+0.2	+0.2	+7.6	+7.8
Protein	+0.4	-1.2	-1.2	-8.1	-7.6
Wheat	+0.4	+0.6	+0.9	+1.8	+2.0
Rice	+0.5	+1.0	+1.2	+1.1	+1.4
Beef	+0.0	+0.2	+0.2	+0.4	+0.4
Poultry	+0.0	-0.4	-0.4	-2.1	-2.0

Source: @2030 simulation results

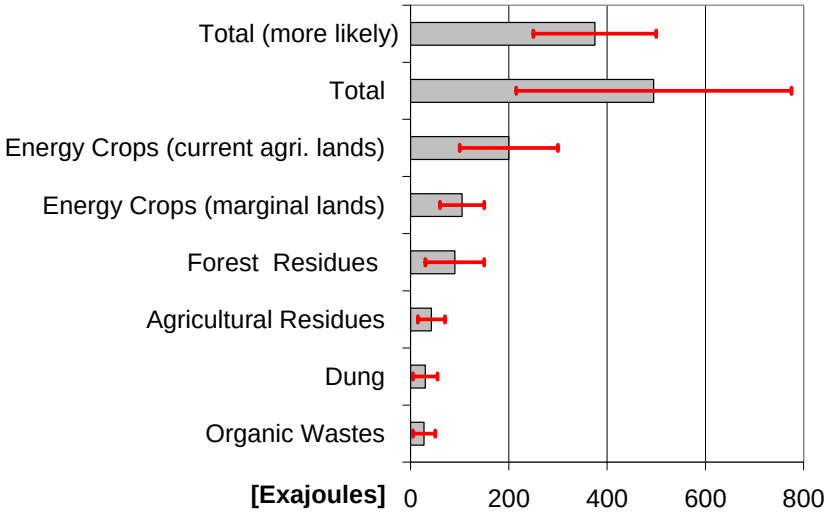
1. This is only a very small snapshot of the overall biofuel market, no woods, no wastes, no cellulosic fibres only a few market crops, however, important currently market crops.
2. The scenarios are based on 10 mmt of feedstocks, which deliver different quantities of energy per tonne. Note that the energy per ha is quite different from the energy per tonne figures due to different yields. also note that the competitiveness of these crops also depends, in fact depends crucially, on by products (oilcakes, electricity, CER, etc.)
3. Impacts on markets

- In general, prices increase with rising use of agricultural feedstock;
- Own price increases pull up prices for other crops through cross price effects
- As more feedstocks enter the biofuel market, the price effect for an individual commodity increases. For instance, sugar prices increase by 9.8% in the case of sugar only and by 14% if competition from maize and soybeans is added. This essentially reflects the fact that the supply responsiveness gradually declines as demand expands to more and more crops. I.e. high elasticity for individual crops, low elasticity for the aggregate production frontier.
- As the assumed impact is an isolated energy demand shock, feedstocks with protein rich by-products trigger a decline in protein prices and animal products for which protein prices are a major input (poultry prices in the case of soybean and maize as feedstocks); the change in relative prices, i.e. the decline of protein prices relative to energy prices is strong for small quantities but could expected to decline with higher quantities of protein rich feedstocks entering the biofuel cycle. The divergence in relative price will be limited when the energy in protein feedstuff in feed rations becomes cheap enough to replace energy from energy-rich feedstuffs (cassava). With a view to the longer-term developments, the decline in relative prices should also be limited by new conversion technologies (gasification of protein) that allow to turn the protein rich by-product directly into bioenergy “gasification of protein feeds).

4. Links between the energy and the nutrition transition
    - Less energy consumption, more protein (overall positive, except where countries are in high deficit of both)
    - Low demand elasticity will limit the positive impacts in developed countries but higher responsiveness of consumers in developing countries could increase food security problems

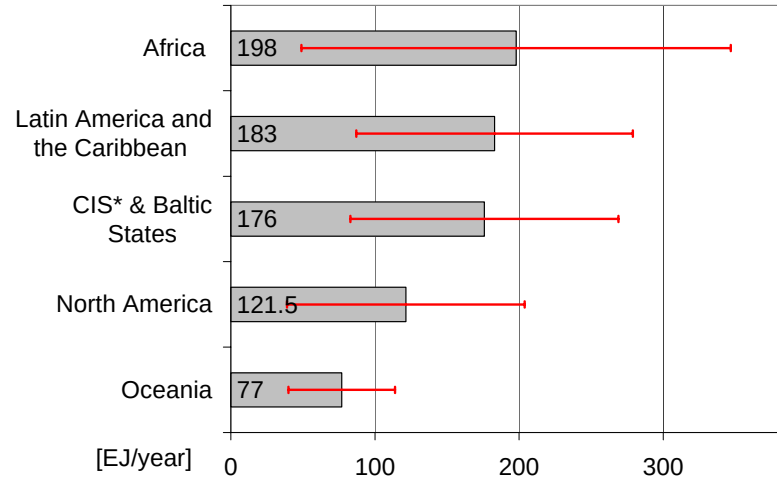
- Footnote: The implied acreage needs for the 0.349 EJ would be 6.5 million hectares. This is much higher than the average (0.9 EJ from 10 million hectares) as all of the biodiesel would come from soybeans which deliver only 590 l/ha rather than the assumed average of 3800 l/ha, which reflects the yield from oil-richer feedstocks such as palm oil and rapeseed.

Bioenergy potential per type of biomass: **different scenarios, year 2050 Exajoules/yr**

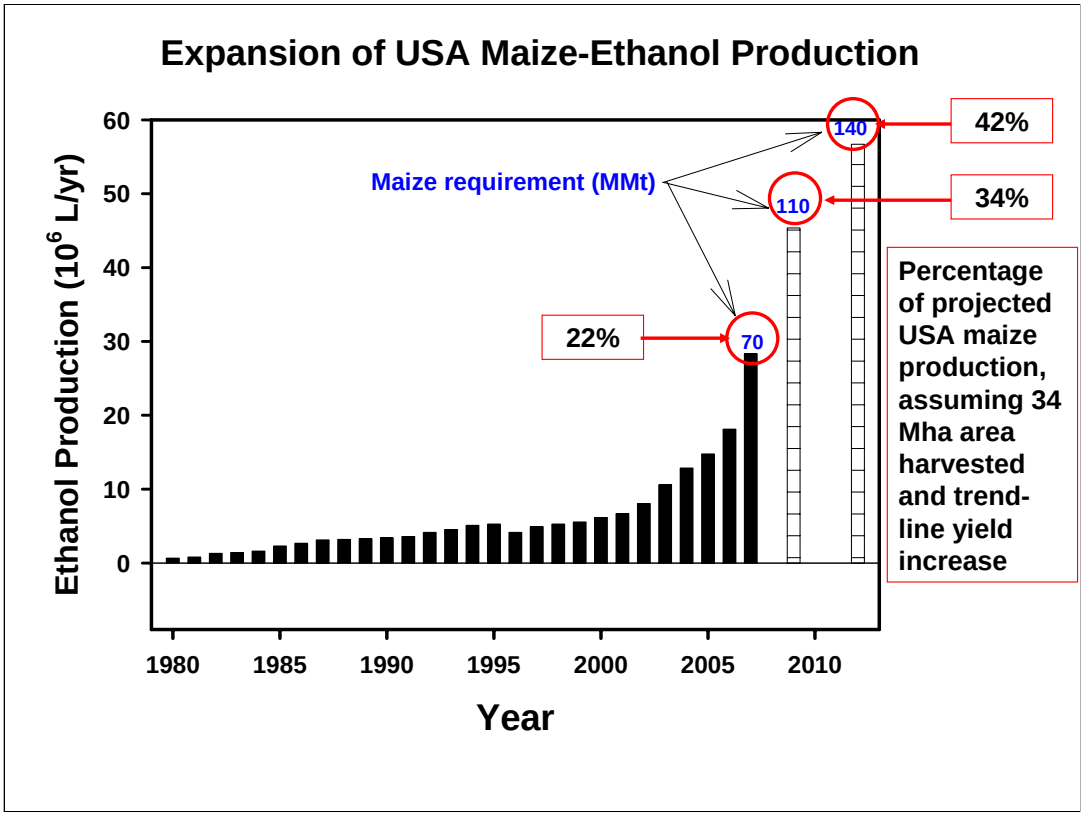


Source: Juergens and Mueller *forthcoming 2007,* based on data from Faaij 2006

Bioenergy potential per region:
different scenarios, year 2050 Exajoules/yr

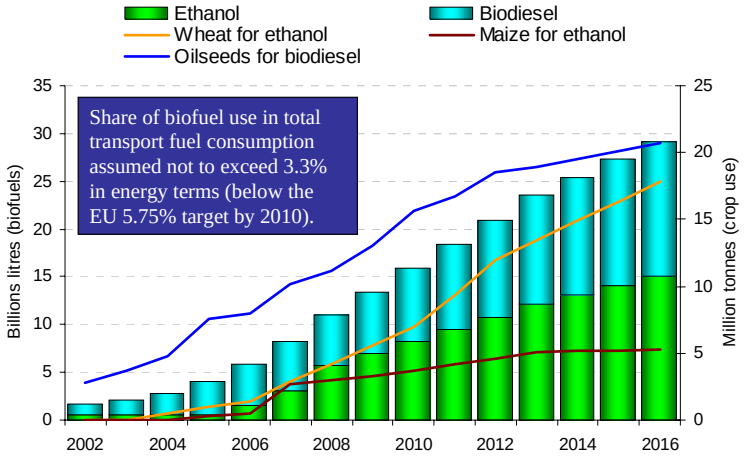


Source: Juergens and Mueller *forthcoming 2007,* based on data from WWI 2006)



Trendline yield in 2007 is 9300 kg/ha, on 34.6 Mha, tottal production in 2007 = 322 Mt. yield increase is 112 kg/ha-yr, and estimated maize area in future years is 34 Mha, and probably less due to balance needed for soybean area.

Ethanol and bio-diesel use in the EU will increase (based on wheat, rapeseed and also imports)

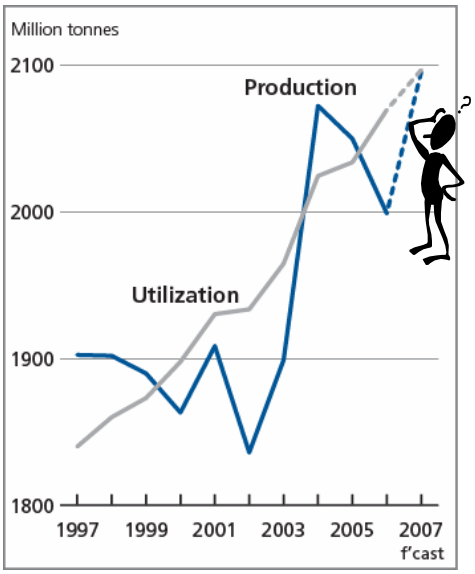


Note: Ethanol and bio-diesel data before 2006 refer to production, from 2006 to 2016 to consumption.

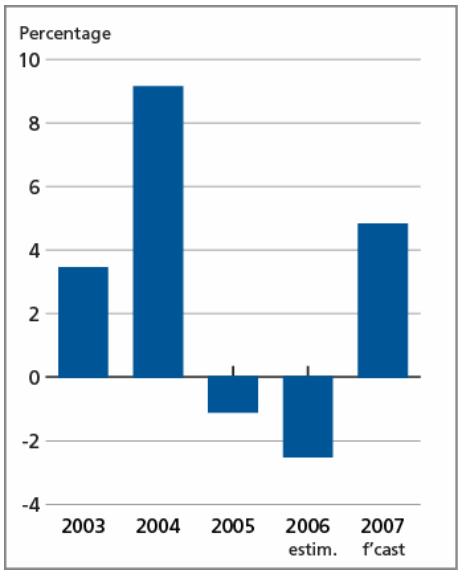
By 2020, under Energy Policy for Europe (for EU-27), the EU is committed to increase renewable energy to 20% of primary energy supply, raise energy efficiency by 20% and biofuel in transport fuels in sustainable ways to 10%.

Source: EU Commission, OECD Secretariat.

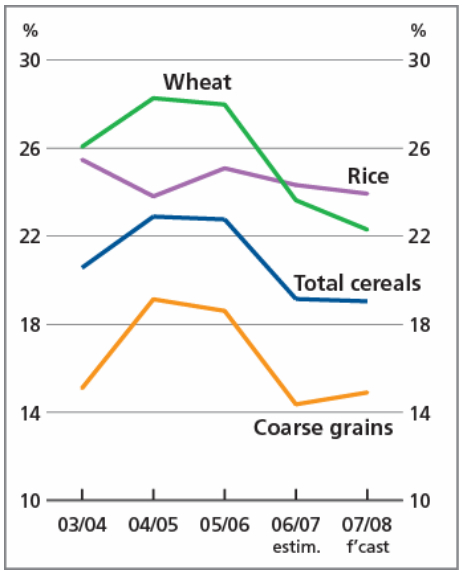
Cereal production and utilization



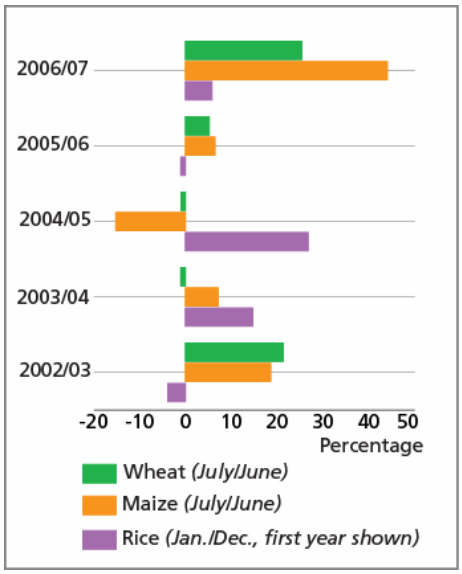
Year-to-year change in cereal production



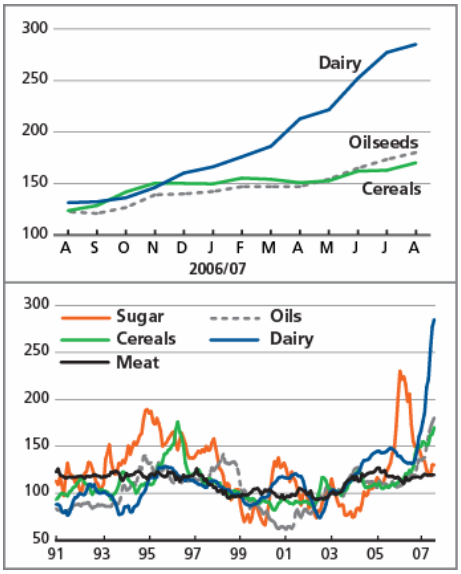
Ratio of cereal stocks to utilization



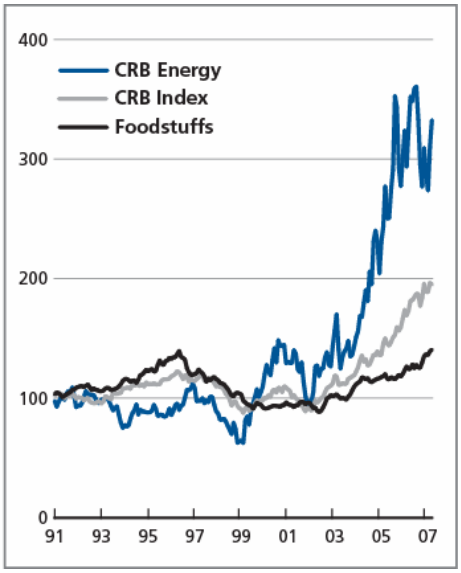
Year-to-year change in selected cereal price indices



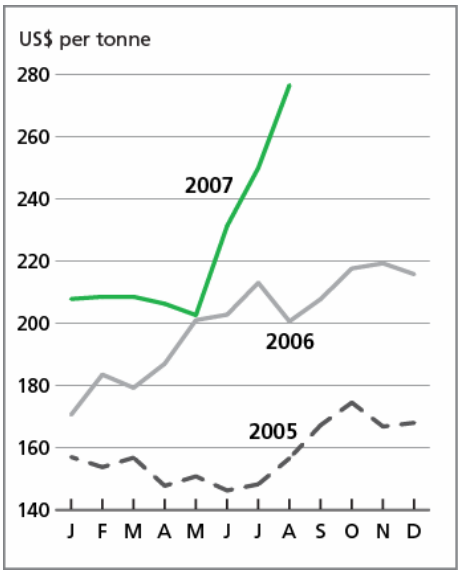
FAO price indices for selected commodities
(1998-2000=100)



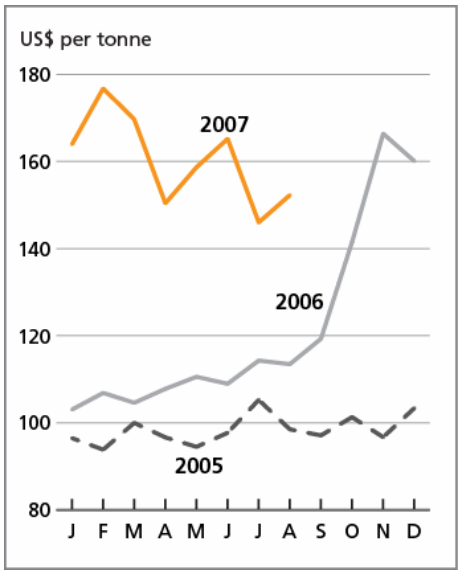
FAO food price index and CRB commodity and energy indices
(1998-2000=100)



Wheat export price
(U.S. No.2 H.W. Gulf)

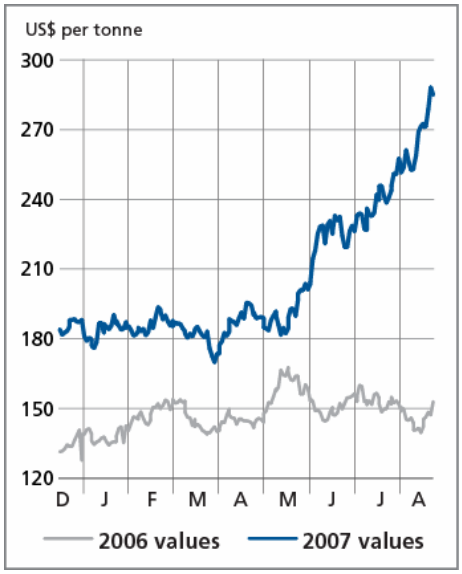


Maize export price
(U.S. No.2 yellow, Gulf)

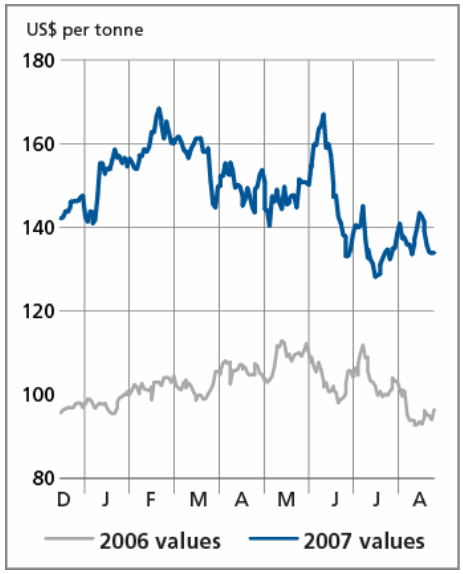


CBOT December Futures

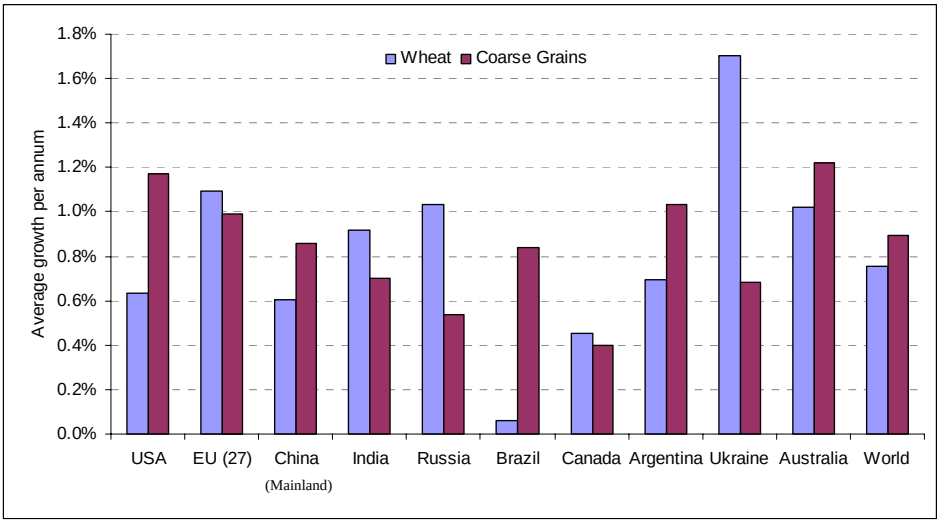
Wheat



Maize



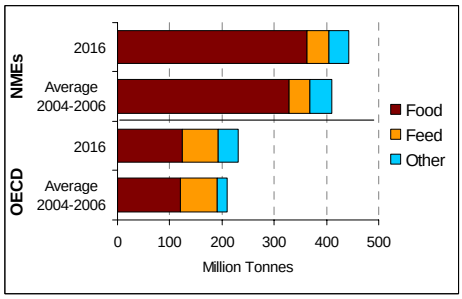
Projected annual growth in grain production



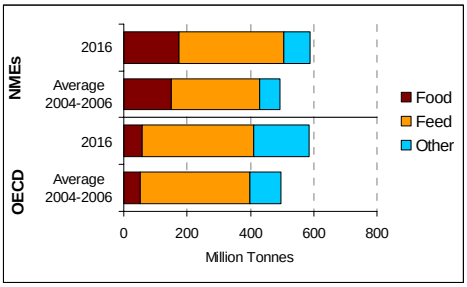
Source: OECD-FAO Agricultural Outlook 2007-2016

Projected grain utilization in OECD and non-OECD countries

Wheat



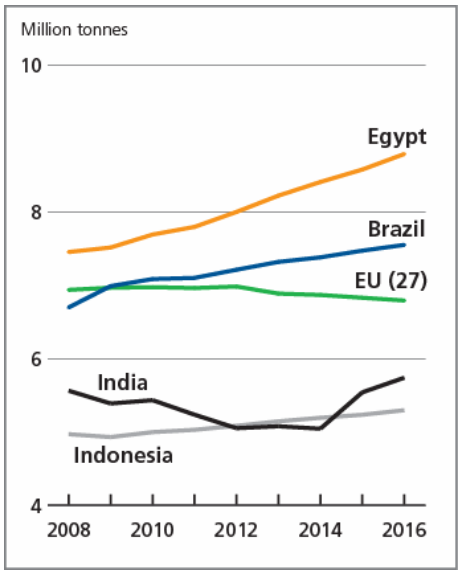
Coarse Grains



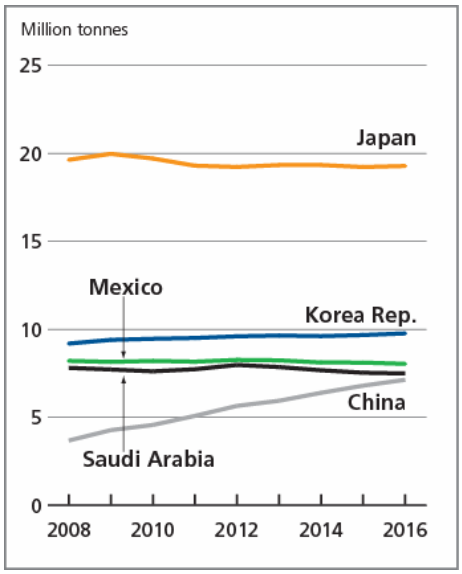
Source: OECD-FAO Agricultural Outlook 2007-2016

Projected Imports

Wheat Imports



Coarse Grains Imports



Overview

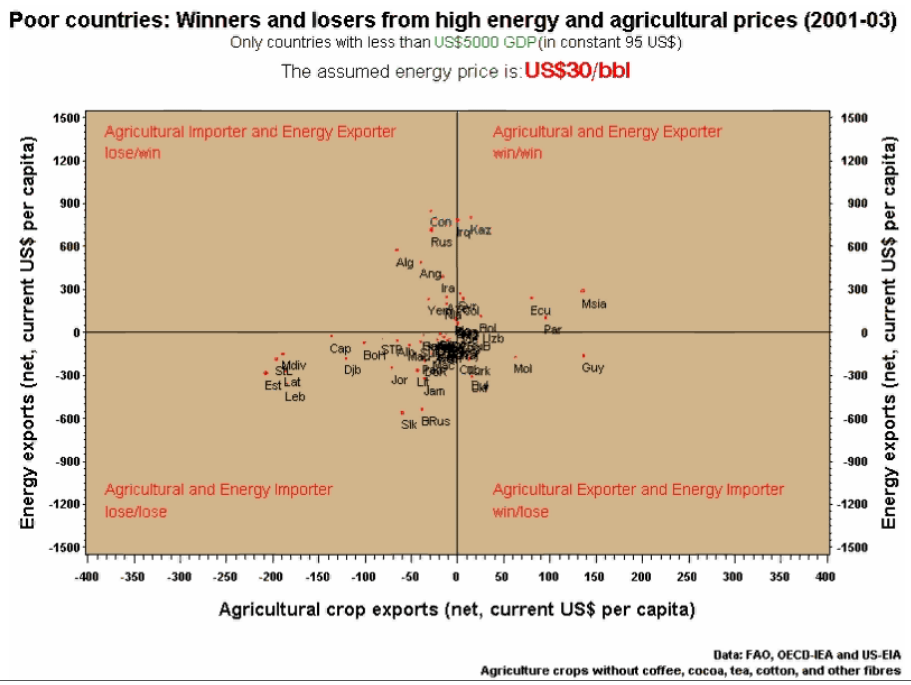
Overview

1. Food markets: where do they come from and where are they heading for?
2. Non-food markets: How big is the potential, globally and regionally?
3. How does an increased use of bioenergy affect food prices and markets and ...

   ... how competitive are the various forms of bioenergy?
4. How does food-fuel competition and higher food and fuel prices affect international food security?

The impacts on international food security

International food security: Boom or bust for trade balances through an increased link between energy and food prices



1. 4 major categories can be distinguished according to their net trade position:
2. Of main concern from an agricultural perspective are the big agricultural importers. The most important ag-import region is NENA; however, NENA benefits much more (factor of 10) from higher prices for energy exports than from the burden to pay more for agricultural imports.
3. Of particular interest from a development and a development assistance point of view are the lose–lose cases. Within this rubric, two main categories of countries are to be distinguished:
4. Importers of energy and agriculture who are primarily importing to be able to export value added of these inputs. These are countries like the Maldives, Saint Lucia, and other tourism destination who re-exporting these inputs as tourism in value-added form. They do however for imports beyond the needs for their tourism industry also bear the brunt for higher prices for both agriculture and energy. The second rubric includes all other cases, they are much more severely hit by higher prices, these are countries like Lebanon or Jordan.
5. The win-win cases are the typical commodity economies; These are countries like Malaysia, Ecuador, Indonesia, or Colombia.
6. Interesting is that countries like Brazil suffer on a net basis more from higher energy costs than they benefit from higher agricultural export revenues, at least in the short run.