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Are the agricultural commodities used for biofuel and non food industries, responsible of market turbolences and famine in the Southern part of the globe? Some evidences from the price trends

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Summary

Agricultural commodities are used for food, feeding, and in growing quantity for new industrial outlets like the green chemistry and biofuel. The use of staple in non food industry mainly for Biofuel production has been accused to be responsible of putting upward pressure on prices of cereal and oilseeds crops. Rising biofuel production, mainly in the US perhaps has had a discrete impact on commodity prices and most notably the maize market, however the magnitude of turbolence is still controversial; a closer look at recent downward trends of staple prices seems to suggest that this hypothesis must be examined more carefully in a broader contest. After the mid of 2008 the prices started to decline sharply and continued througly 2009 suggesting that a number of other factors are needed to be considered to explain the price behaviour including the financial speculation in future markets. There are some factors affecting the long term cycles, structural factors related to tecnological changes and the growing demand for cereals in countries such as India and China', other factors affect the risky prospects for the climatic instability and change in farmers' expectation about revenues and investments, and finally political decisions about incentives in form of premium, aids, tariff, international agreements. This paper analyzed the situation of some ag-commodity markets, particularly those involved in the energy production to examine the causes of instability and consequences for the relations between DC-LDC countries. The conclusions are that the supply of staple products can still grow to fulfill the need of the LDC population and biofuel industry, however, there is quite evidence that most of the price volatility has been caused by future speculation and imperfect information responsible of inefficient farmers' decisions**.**

Key word: biofuel agricultural commodity markets, price changes, economic development

1 - Introduction

The purpose of this paper is to examine the behaviour of agricultural commodity markets in the last decade to suggest that despite the Global biofuel production has seen a three fold increase over the last 20 years, the impact of agricultural comodities allocated in biofuel production is not the main responsible of the ag-commodity market volatility and famine in the Souther countries namely Africa. Price spikes are common in most agricultural markets due to a combination of relatively inelastic demand and supply inertia, that requires some time to adapt to the demand change (Tomeck). Historical data using 1987 as the base year shows that the world wheat prices were at similar level to the present in 1995 and 1996, less than the 2007 peak in nominal terms but 15 percent higher in real terms, this margin vanished in 2009. In the case of wheat 'world production has stayed below world consumption during the last six years. Recently the higher prices are not a result of a sudden surge in demand, which has been increasing at a constant pace (+1%), but rather a 'significant production shortfall in major suppliers' (Australia has had three severe droughts in six years, culminating in production in 2007 half the level of 2003.) While production is already recovering in some areas, this is not the case amongst the traditional top five exporters. Adverse weather conditions affecting the agricultural production in many parts of the world have contributed

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to explain the growth of ag-commodities during the period 2007 through the first half of 2008. Reductions in stocks due lower than expected harvests and higher risk premium have put upward pressure on prices causing more market volatility. Significantly the EC analysis argues that the price fluctuations experienced recently are largely attributable to changes in ending stocks, which at the global level felt by 45% between 2001 and 2007 (from 201.6 million tonnes to 111.0 million tonnes). The EC argues also that changing global stock levels have been driven by supply factors. It is also debated the impact of speculative investments and financial operation that directly or indirectly invested the agricultural commodity prices. Higher oil prices have an impact on the agricultural industry: the Sustainable Development Commission has estimated that an increase in oil price from $50 to $100 a barrel could cause an increase in production costs of 13 percent in commodity prices for crops and 3-5 percent for livestock products. Low investments in agriculture and legislative constrains in the EU have contributed to slow down the progress of productivity increase with reduction of fertilizer use. In 2009 the USDA report suggests a slow decrease in cereal production namely the wheat and barley that affected more markedly in US and at lesser level EU while increased consistently in China; this resulted in higher final stock reserves (170 million ton). The total production for 2009, including ending stocks is forecasted to pick 830 million ton with an increase of 3,5% of wheat compared to the previous year, well above the world consumption estimated to 646 million ton. The exceeding supply not countervailed by short term demand of ag-commodities and the permaining low oil price suggest the continuation of this cereal downward price trend for the near future. The trade contraction is also caused by the North Africa that increased the production from 14,5 to 19 million ton and many Asian countries. The Mais production forecats are for an hystorical record of 794 million ton concentrated in USA that represent the 40% of the world crop and good production in Argentina and Brasil. A record also for the soybean crop with 244 million ton in the three major producers: USA, Brasil, Argentina with favourable effects on world prices. FAO reports that with the second-highest recorded cereals crop expected this year and stock replenished, the world food supply looks less vulnerable to shocks than it was during last year's food crisis'. FAO projects relatively weak growth in cereals demand of around 1.3% this year. The cereals trade is expected to contract by 4% as domestic production recovers in some countries. However, FAO suggests that the weakness of the US dollar and 'the sharp rebound in energy prices witnessed in recent weeks could exert renewed upward pressure on the international prices. Population growth in Asia, Africa and the Middle East is expected to drive a growth in demand, with expanded ethanol production making a secondary contribution to demand growth for wheat. As regards prices, however, 'wheat prices in 2009/10 are projected to continue the downward trend of the previous season, before levelling off (in real terms) throughout the rest of the projection period.

Tab 1 – Forecast on cereal world production

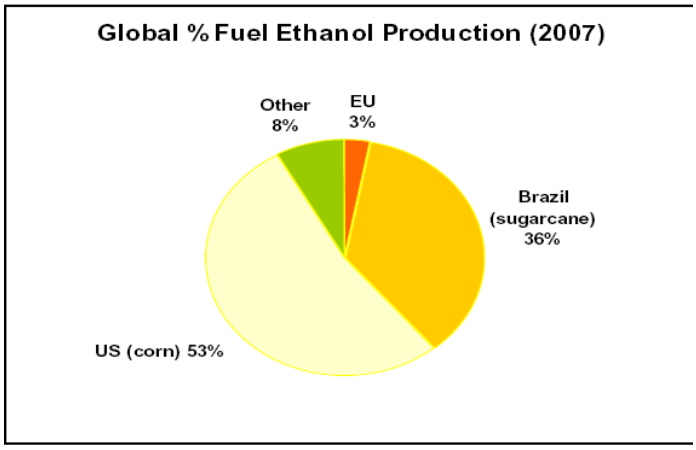
Crop	2008/09	2009/10	% change
Wheat	682,3	668,1	-2,1
Forage cereals	1101,2	1092,5	-0,8
Mais	789,4	794,1	0,6
Barley	153,9	142,9	-7,1
Sorghum	61,9	62,4	0,8
Oat	26,5	23,7	-10,6
Rye	17,4	16,6	-4,6
Soybean	210,6	246,1	16,8

Source USDA

The world consumption of Maize is accelerating, driven by increasing demand in developing countries – mainly China and Mexico – and use for ethanol in the US. Production has responded to higher prices, with the area under maize and yields expected to increase further, adding over 100 million tonnes of production to reach 910 million tonnes in 2018/19. Ethanol will be the main driver of demand growth up to 2015, with animal feed growth dominating in the subsequent period. 'Over the next 10 years, maize net trade is projected to increase, reaching 92 million tonnes in 2018/19'.

Maize prices 'are expected to remain high (about +50% over the projection period, compared to the average of the decade before). The International Food Policy Research Institute in Washington has warned that 'if current plans for biofuel production by leading producers like the EU and USA are achieved, corn prices will increase by 26% by 2020', but that prices could increase by 72% if 'biofuels production exceeds these targets'. Meanwhile the USDA is reporting bumper cereals crops in some regions, with South African production up by 3.7 million tonnes from last year at 11 million tonnes. Similarly the FAO is projecting a significant increase in world cereals production in 2008, although it is expected that cereal prices will remain at record levels, with dwindling stocks and continued strong demand. International wheat prices rose by 83% in the year to January 2008. Low-income food-deficit countries saw a 2% decline in import volumes but a 35% increase in import costs of cereals. The increase in prices was even higher in Africa.
The diffusion of GMO seeds over US, Agentina and Brasil suggest that these productions will prevail in the near future and will broad the technological gap with EU where legislation is quite restrictive; in Africa the problem is more in term of capital investment and availability of seeds adapted to arid climate. The progress in biotechnologies and liberalization of GMO seeds could also affect positively in medium-long term the productivity of the most cereal and oil commodities with positive impact for the supply of these products in different market outlets.
Second generation biofuels derived from cellulose have the potential to reduce land requirements and increase the productivity; new plants as switchgrass (Panicum virgatum) specialized in biomass production can fulfill the demand of cellulose material. Third generation biofuel derived from new vegetables targetted to biofuel and green polymers production will probably substitute the agricultural ones, contributing to improve the energy balance and LCA (Craig Venter, Programming the algae for biofuel production, Exxon project, june 2009).

Fig 1 - Global fuel ethanol production (2007)

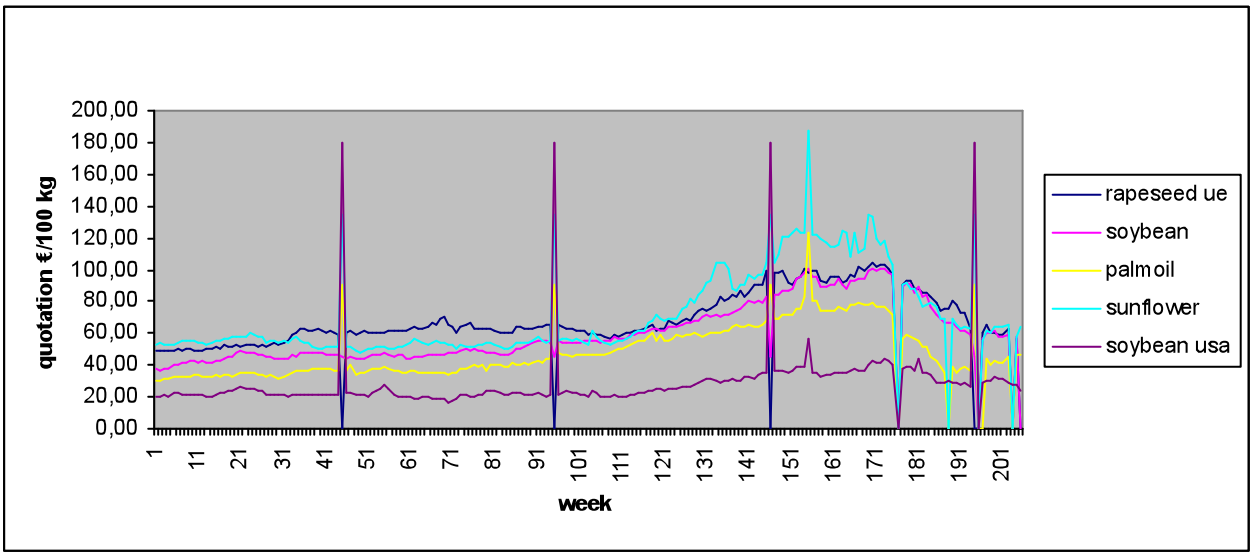


2 - Price trends

The changes in agricultural prices have historically not been fully reflected in the subsequent steps of the agroindustrial chain. Several studies have attempted to evaluate the future impact of biofuel production on staple prices; the results should be taken with caution as the relations between agricultural and biofuel markets are not yet fully understood. Wheath and maize prices increased by 136 and 31 percent respectively in the week ending 17 March 2008 compared to the equivalent week in 2007 (see figure 1). Other things being equal, additional demand for biofuels can be expected to put upward pressures on the prices of the soft commodities which are currently used to make them (see figure 2). It was suggested that biofuels are the force behind the latest increases in the cost of basic staples, causing some the recent food price changes around the world.
In the following picture it is reported the price quotations of some agricultural commodities at the Rotterdam future market during the period february 05 – february 09. Vertical lines separate the one year – period observations: it can be observed that in 2005 and 2006 prices remained quite stable,

started to soar up in 2007 and first part of 2008 and to decline afterward. Prices of agricultural commodities are closely related to the oil prices (not reported in the picture)

Fig.2 - Price quotations of some agricultural oil commodities at Rotterdam future market: period feb 05– feb 09.

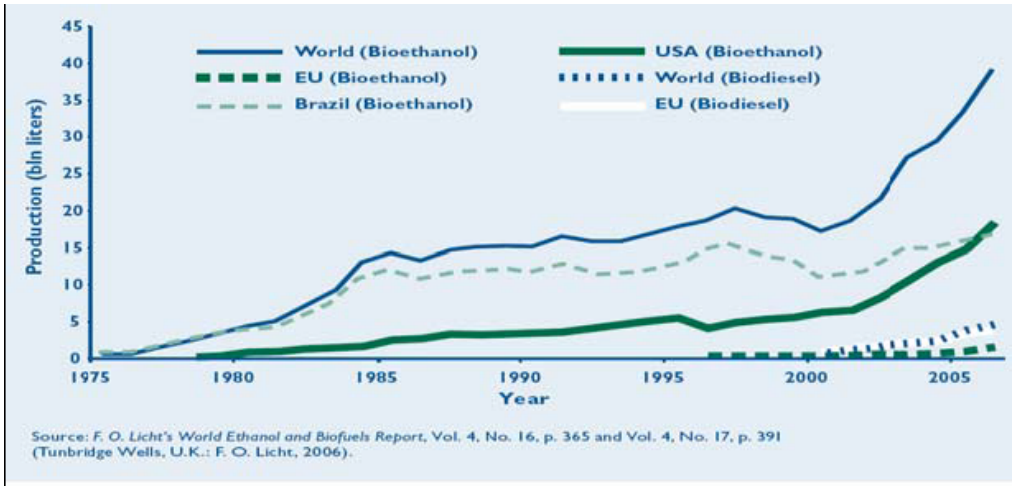


Over the last few years the rise in energy prices, political tensions in some oil producing regions, uncertainties about the future supply and growing difficulties to access to non-renewable resources and environmental concerns have made the biofuel production at the top of many countries' policy agendas. The debate about biofuels has become increasingly polarised and sometimes radicalized: some have enphasized the potential impact of biofuels on food security with positive impact for the third world hunger. The most striking evidence was offered by the Mexican tortilla prices that increased in 2008 by up to 400 percent as a consequence of the maize diverted to ethanol production in the US. (Gidley, 2008). However thesituation in 2009 has changed radically to upturn to a lower prices.

3 - Biofuel production prospects

The liquid biofuels produced from land-based energy crops are: bioethanol derived from sugar or starch crop fermentation (e.g. sugar beet, sugar cane, maize and other cereals) and biodiesel derived from vegetable oils (e.g. rapeseed, sunflower, soybean or palm oil) through the transesterification reaction with methanol.

Fig. 3 - World biofuel production



The first large-scale schemes for biofuels production began in the early 1970s (in Brazil and the US), but only recently as a consequence of the soaring up of the fossil oil price, the biofuels were

considered a viable fossil fuel alternative. Ethanol makes up most of the total biofuel production, with 96 percent of total biofuel production represented by ethanol and the remaining 4 percent is biodiesel. Production of biofuels is largely concentrated in Brazil and the US accounting for almost 90 percent of the global ethanol production. The EU on the other hand produces relatively more biodiesel, accounting for more than 80 percent of world biodiesel production.

The world production of biofuel will continue to increase at an estimated 5% rate per year reaching in 2017, 105 milion ton using 170 milion t of cereals corresponding to 9% of the total crop. Similar production increase is expected for biodiesel at an annual ratio of 7% annuo; in 2017 the supply could be 21 milion t of which 20 mio t of vegetable oil corrresponding to a 15% of the world production. (OCSE).

Tab 2 - World ethanol trade

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Brazil	928	647	719	779	856	940	1,007	1,072	1,137	1,198	1,255
China	42	8	5	-8	-33	-52	-72	-90	-106	-121	-133
EU-25	-71	-124	-129	-145	-154	-182	-193	-205	-219	-232	-244
India	-118	-152	-147	-152	-164	-171	-179	-185	-189	-193	-195
Japan	-171	-196	-209	-222	-235	-246	-258	-269	-281	-292	-302
S. Korea	-75	-84	-90	-96	-103	-110	-116	-123	-129	-135	-142
U.S	-679	-237	-286	-288	-295	-300	-306	-311	-316	-322	-327
ROW	23	17	15	11	6	1	-5	-11	-18	-25	-33

Source FAPRI

4 - Biofuels and recent changes in commodity prices

Agricultural commodities have traditionally been subject to price distortions due to protective trade barriers and farm subsidies. Although there has been a reduction in trade distorting support measures, agricultural markets remain subject to significant levels of government interventions. Price spikes are common in agricultural markets due to a combination of relatively inelastic demand and volatile supply. In the short run, supply of cereals and oilseeds cannot adjust to unexpected changes in demand because in general there is only one harvest per year. The price is the main instrument to clear the market in the short term, in the medium term, supply is fairly responsive with a sort of recursive model $Q_s = f(P_{t-1...})$ which can lead to large price swings. Expected changes in supply and demand have much smaller impacts on prices than unexpected events such as bad harvests or huge purchase from one country. The expected production increase for 2007/08 was interpreted as the supply responses to shortages in the previous year. World grain production is fairly concentrated and a significant fraction of production is traded across regions (around 17 percent). The hystorical five major exporters are Argentina, Australia, Canada, the EU and the US.

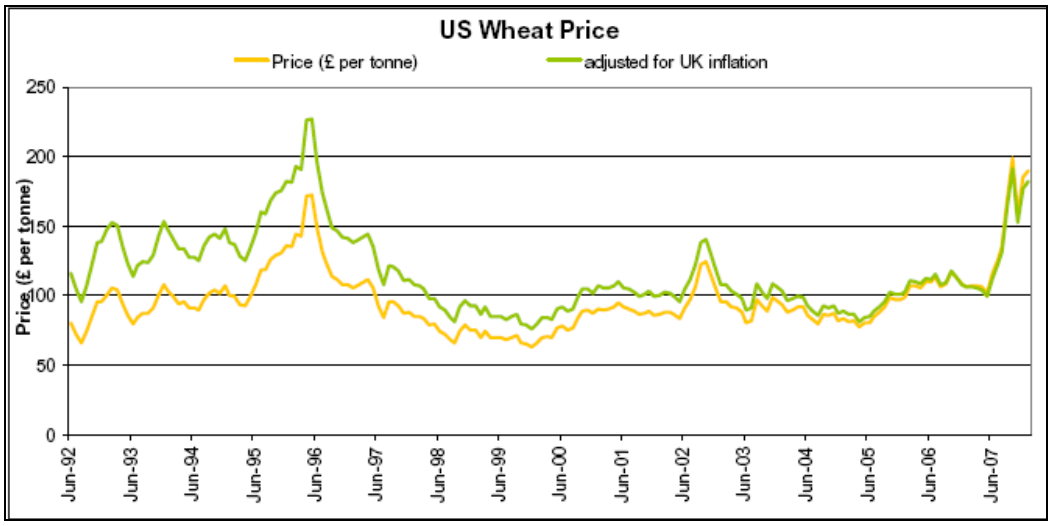
Tab 3 – The grain situation in last year

Wheat (million tonnes)				
	2004/05	2005/06	2006/07	2007/08 (estimate)
Production	628	620	592	604
Trade	110	110	110	104
5 major exporters	86	80	80	76
US exports	28	27	25	33
Maize (million tonnes)				
	2004/05	2005/06	2006/07	2007/08
Production	713	695	698	966
Trade	76	79	88	97
5 major exporters	70	76	80	90
US exports	47	51	56	62
Total Grains (million tonnes)				
	2004/05	2005/06	2006/07	2007/08
Production	1649	1602	1572	1659
Trade	212	215	221	228
5 major exporters	164.7	161.8	165.1	174.9
US exports	81	84	85	103

4.1 - Cereal prices

Maize with sugar cane is currently the most important feedstocks for the production of bioethanol. This section describes recent developments in sugar and cereal prices and explains the drivers behind the price movements.

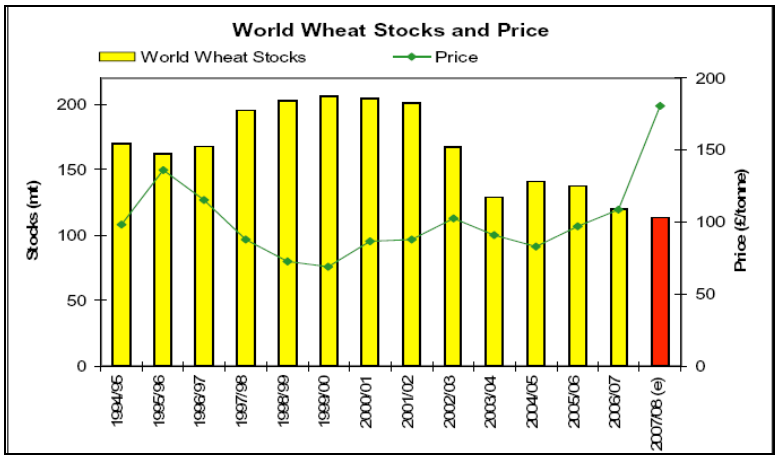
Figure 4 - Nominal and real wheat price trends



4.2 – Change in ending stock and price movement

A fundamental driver of the cereal price is the level of inventories at the end of the crop year. Ending stocks are viewed by the industry as the "buffer" to absorb demand shocks or reductions in supply in the following year. Low stocks increase the perception of risks and therefore leads the operators to increase their reserves causing a price increase. There is a quite evidence of inverse correlation between stocks and prices: the world stocks for wheat and maize were at exceptionally low levels during the period 2003-08, for example the wheat stocks to usage ratio has fallen from 35 percent in 2000/01 to an expected 19 percent for 2007/08. This situation reversed in 2009; there is a fast recovery in stocks that suggest the higher supply elasticity due to unexploited land in different parts of the world. There is a negative correlation between stocks as a percentage of consumption and world prices. Over the last decade or so, stocks to usage ratios have followed a downward trend. When wheat stocks are at their highest, as between 1998 and 2001, wheat prices tend to be at their lowest. This year, as a result of the bad harvest, world cereal stocks in the main exporting countries are at low levels. For example, the EU public stocks of cereals fell from a peak of 17.4 million tonnes in 2004 to 14.6

Fig 5 - World wheat proces and stoks



4.3 - Export restrictions

Over the last few months, as a response to global shortages and bad harvests several countries have adopted restrictions on their supply to world markets, thus adding further pressure on cereal prices.
In Argentina, the government temporarily closed its wheat export in November 2007 in order to assess crop damage from the frosts in wheat farming areas and to assure that enough wheat would be available for the local market. At the end of January, 2008 traders were allowed to apply for a licence to export wheat. However, the Agriculture Secretariat restricted the volume of wheat to be exported in 2007/2008 to 2 million tonnes. These restrictions were also reflected in the exports of finished products, the meat driving to a conclusion that some of the most exporting countries are facing their domestic food security problems and this impact on the stability of the world markets.
In June 2007, Ukraine's government imposed prohibitive grain export quotas, limiting shipments to 3,000 tonnes each for wheat, rye, barley and maize in a bid to replenish domestic stocks. Export quotas have now been extended until the end of March 2008. Russia introduced a higher export tax for wheat of 40 percent or no less than €105 from the end of January.12. The Indonesian government raised the palm oil export taxes in June 2007 to 6.5 percent (from the previous 1.5 percent). It was followed by an increase to 7.5 percent in September and to 10 percent in November 2007. This means a significant tax burden considering the already high export prices.
These export restriction reveal a situation that was not so evident before: the opportunities in international biofuel market improved the economic prospects of the eastern EU countries for the increasing demand of agricultural commodities used for food and biofuel. Commodity markets, including agricultural commodities, have recently seen an inflow of 'hot money' from various investors. Financial investors have become more interested in investing in rising agricultural commodities, which have become increasingly attractive as a class of assets at a time when the dollar and stock markets are weak, and US interest rates are low. One view is that non-commercial investors (e.g. speculators) take positions that follow fundamental price movements, rather than drive them. And certainly, as a class, speculators have an essential role to play in providing liquidity in the market to allow hedgers to manage various commercial risks thereby facilitating improved the price discovery. However, others take the view that some of the price increases in February and March 2008 for many agricultural commodities can be attributed to an influx of money from institutional investors.

5 - Biofuel policy and agricultural prospects in the European Union (27 countries)

In 2007, the EU agreed a conditional minimum target of 5,75% of biofuel mixed with fossil fuel by 2010 and an increase to 10 percent by 2020; these targets assume the sustainability of production, commercially availability of second-generation biofuels, and amendment of the Fuel Quality Directive to allow adequate levels of blending. A study performed by DG Agriculture of the European Commission, suggests the implications on European land use in 2010 to reach the 5.75% biofuel production target: to produce 24 million ton of biofuels, replacing 18.6 million ton of fossil fuels currently used produced inside the EU, would require from 16 to 18 million ha of agricultural land. As the total arable area in the EU is around 103.6 million ha, this means that almost the 20% of all currently available arable land should be dedicated to biofuel crops. Although on a first view this does not look very realistic, there is a lot of flexibility since there are almost 4 million ha obligatory set-aside land in the EU-15, and almost another 3 million ha of suitable land currently not cultivated, which could be diverted to energy (biofuels) crop production. Today, the EU also produces a surplus of food stored in the intervention stocks. The market situation of this year (2009) with a generalized decline in prices of agricultural commodities and stocks increased support the evidence that there is a space for using a quota of crop products for biofuel production with benefic effects for farmers. Productivity and yields have scope to increase by adopting the available agricultural technologies (e.g. in Eastern Europe yields can be increased 15% by adopting existing good agricultural practices: fertilization, irrigation. In January 2008, the EU Commission published its proposals for the biofuels sustainability rules to determine the structure and the composition of

biofuels usage. In these proposed rules the Commission set a minimum value of 35 percent of GHG savings, which biofuels must achieve in order to count towards the biofuels target. The sustainability criteria are still under negotiation. EUCAR, CONCAWE and JRC evaluate the effect of a 5.75 percent EU biofuels target on cereal and oilseed prices using the FAPRI food commodity price projection to 2012. The analysis report argues that reaching the EU biofuels directive target of 5.75 percent replacement would represent an additional demand of 9 percent of 2012 world oilseeds supply, assuming a 5.75 percent share of biodiesel in diesel consumption. From market flexibility indicators, they conclude that the world price would then increase by between 6 and 16 percent. The extra cereals needed to produce a 5.75 percent share of bioethanol in petrol consumption would only represent 1.5 percent of the projected world cereal production, thus the cereals market would only be marginally affected by the biofuel option. An analysis carried out using the OECD Aglink model suggested that in the EU-15 the 5.75 percent target of the Biofuels Directive will not meet; instead an incorporation rate of 4.2 percent will be met in 2010. Cereal consumption was altered in the model to include a 4.2 percent incorporation rate, thus consumption and production of cereals will increase compared to the baseline. The results show that wheat consumption is projected to increases by 6 percent in 2010 and coarse grain consumption increases by 8 percent by 2010 compared to the baseline. Similarly, wheat prices increase by 5 percent and coarse grains by 7 percent in 2010 compared to the baseline. Furthermore, the assumptions in the model are similar to those of the OECD study; in addition, it assumes the same elasticity of demand for biofuels and other industrial uses, absence of trade in biofuels and constant technology.

The European Commission carried out a set of simulations in order to analyse the impact of increased biofuel demand. One of the simulations assumes that the market share of biofuels increases to 5.75 percent in 2010 and a regulated market prevails. The results suggest that half of the projected biofuel demand of the EU25 in 2010 could be served by domestically grown feedstocks: through increased production driven by price increases for cereals (6 to 11 percent) and oilseeds (5 percent to 15 percent), shifts in consumption and reductions in exports. Increasing production of feedstock would be reached by expanding cereal and oilseed production by 4.1 million hectares, or around 4 percent of the total arable land of the EU25. The additional production of cereals and oilseeds would contribute to 21 percent to the biofuel demand. The usage of sugar beet in the most productive regions could contribute with an additional 4 percent. In total, 25 percent of biofuels needs in 2010 could be served by increasing production of EU feedstocks under these assumptions. The second simulation assumes a 5.75 percent market share as well as a deregulated market where all tariffs on biofuels and feedstocks are phased out. The analysis suggests that 27 percent of EU biofuel demand will be served by domestic production, mainly due to increased oilseed production caused by higher oilseed prices (5 to 12 percent). The phasing out of tariffs on biofuels and feedstocks would cause cereal prices to decline (-15 to -20 percent) due to the substantial increase in imports. Further analysis by the European Commission assessing the impact of the 10 percent by energy biofuel target for 2020 indicates that prices for agricultural raw materials in the EU would increase by 3 to 6 percent for cereals and 5 to 18 percent for oilseeds. The likely increase would have a relatively smaller impact on food prices – given the share of raw-material costs in the price of most foods. Koonin (2006) has estimates that biofuels could supply 20-30 per cent of global fuel demand in an environmentally responsible manner without affecting food production. In the EU, the main feedstock for biodiesel is rapeseed. EU production of biodiesel is estimated to have used 4.1 million tonnes in 2004 or the equivalent to around 20 percent of the EU-25 total oilseed production. The raise in palm oil production has been associated with the boom in biofuel production, however at present only 1 percent of palm oil is used for biofuels. There will have been some indirect impact as more rapeseed is used for biodiesel but overall, the use of vegetable oils for biodiesel remains small compared to other uses. Expectations about the increase of cereal and oilseed use in future might have had an impact on prices though and might have inflated commodity prices.

Tab 4 – Cereal and oilseed evolution in the period 07 - 10

Country	Cereal		Oilseed	
	Surface (000 Ha)	Production	Surface (000 Ha)	Production
Total Ue 07	55592,9	352548,9	10150,3	23383,4
Total Ue 10	52913,4	343248,8	13183,9	29443,1
% var 10/07	-4,8	-2,6	29,9	25,9

Situation in United States. In 2005, the Energy Policy Act was passed. The legislation set a target of 7.5 billion gallons of renewable fuels to be used by 2012. Since then, a new "Energy Independence and Security Act 2007" has been agreed. The new act requires 15 billion gallons fuel ethanol by 2015 and 36 billion gallons fuel ethanol by 2022. However, under the new act, 21 billion gallons out of the 36 citied will need to be produced from advanced biofuels.

Tab 5 – Target and consequences of the biofuel policies

Countries	Targets	Comments
EU	5.75 percent by 2010, 10 percent by 2020	The 2020 target is subject to the sustainability rules as well as the commercial availability of second generation biofuels
Australia	1 percent by 2010 - or at least 350 million litres of ethanol or biodiesel	
Japan	The government has provided goals to use 500 million litres of fuel derived from biomass in fuel for transport by 2010, through promoting the use of E3. This would be a prelude to a national E10 blend standard by 2010	Ethanol dominates biofuels in Japan. Currently, fuel-use ethanol is not made or used commercially in Japan while only about 2000 kl of biodiesel is produced annually
China	Biofuel development policies are aiming to increase ethanol production to 6 million tonnes by 2010 and 15 million by 2020.[5] (By way of comparison, the US was expected to produce 24.6 million tonnes in 2007)	Up until September 2007, the main biofuel produced was ethanol from maize. Since then China's government has announced an "Agriculture Biofuels Industry Plan" which implements a shift away from food grain ethanol feedstocks to non-food crops inputs such as sweet sorghum and cassava
USA	US Energy Bill was ratified in August 2005 and fixes the quantity of renewable fuels that must be consumed in 2012 at 7.5 billion gallons. The 2007 Act requires 15 billion gallons fuel ethanol by 2015 and 36 billion gallons fuel ethanol by 2022	Note that under the new act, 21 billion gallons of the 36 stated by the act will need to be produced by advanced biofuels by 2022
Argentina	5 percent by 2009	
Brazil	An incorporation rate of 2 percent for biodiesel is compulsory, growing into 5 percent by 2013. All gasoline sold in Brazil must contain between 20 and 25 percent ethanol blend (by volume)	Focus is on ethanol from sugar cane
Thailand	Its targets for biofuel use in 2010 equate to 2 percent of projected energy needs	

6 - Oil prices

Higher oil prices may have significant impacts on the agricultural industry for two main reasons. Firstly, higher oil prices will increase the costs of inputs such as fertilizers and pesticides as well as fuels, heating and energy use. Second, the biofuel sector may develop significantly as a result of expected positive prospects on market returns. In this context, land may be taken out of food production to grow biofuels or commodities may be directed to different markets other the traditional feed and food uses, adding further pressure on cereal prices. Finally, some studies suggest that grain prices have become increasingly correlated to oil prices. Oil price is growing as leading market indicator, unfortunately the oil market is characterized by a big financial speculation: for one barrel of oil there are at least 23 of equivalent paper traded as future contracts Feed and food uses still dominate cereals, sugar and oilseed markets and there are too many factors affecting agricultural and soft commodities to make this a close. A study recently published by the

Sustainable Development Commission concludes that oil prices will impact directly and indirectly on farm production costs with a magnitude depending on the production system.
Moving from $50 to $100 for a barrel of oil would increase production costs of livestock products by between 3 and 5 percent and crops by 13 percent of commodity price. An economic assessment report also published in July 2008 by the OECD agrees with the World Bank report regarding the negative effects of subsidies and trade restrictions, but found that the impact of biofuels on food prices are much smaller than the 70 –75 % of rise in food prices. The OECD study is also critical of the limited reduction of GHG emissions of biofuels produced in Europe and North America, concluding that the current biofuel support policies would reduce greenhouse gas emissions from transport fuel by no more than 0.8 percent by 2015, while Brazilian ethanol from sugar cane reduces greenhouse gas emissions by at least 80 percent compared to fossil fuels. The assessment calls on governments for more open markets in biofuels and feedstocks in order to improve efficiency and lower costs.

7 - Do the cereal prices affect the consumer food prices?

First it is examined the degree of transmission of price changes along the supply chain (between the producer and consumer) and second to look at the impact of higher agricultural commodities on consumers in developing countries. Studies undertaken by the European Commission assert that prices in agriculture are more volatile than consumer prices even on an aggregate level. Over the last seven years agricultural producer prices tended to slightly decline in nominal terms and more strongly in real terms, while food prices increased both in real and nominal terms. Similar changes can be observed for many agricultural commodities.

Tab 6 – Changes in producer prices

	1st semester 2007/ 1st semester 2006	August 2007/ Aug-06	August 2007 1st semester 2007
Wheat	45%	78%	40%
Maize	30%	50%	37%
Poultry	21%	30%	10%
Pigs	-8%	-10%	12%
Beef	-2%	-1%	-1.50%
Butter	5%	46%	34%
SMP	32%	76%	35%
Cheese	0%	18%	15%
Rapeseed oil	-4%	n.a.	n.a.
Changes in consumer prices			
	1st semester 2007/ 1st semester 2006	August 2007/ Aug-06	August 2007 1st semester 2007
Bread	2%	4%	2%
Poultry	4%	6%	2%
Pigs	-2%	-2%	2%
Beef	0%	0%	0%
Butter	4%	32%	24%
SMP	22%	53%	25%
Cheese	0%	9%	8%
Rapeseed oil	-2%	n.a.	n.a.

Source : European Commission

The European Commission identifies several reasons why large fluctuations of agricultural producer prices do not lead to large effects on consumers. First, the share of agricultural raw materials in food production costs tends to decrease with degree of manufacturing; more important factors affecting the final goods are labour, capital and energy prices. Second, food-supply chains tend to have competitive structures and in some food sectors and countries the structures may restrain the transmission of primary commodity price changes to consumers. Third, increasing household incomes causes consumer behaviour to change and food costs as a proportion of incomes

have been on a downward slide since World War Two. Finally, as discussed below, food prices changes tend to have a smaller effect on consumers in developed countries as the share of income designated to food is relatively small as a proportion of total disposable income (and consumers tend to buy less-processed food).

Fig 6 - Consumer price index for different cathegories of goods

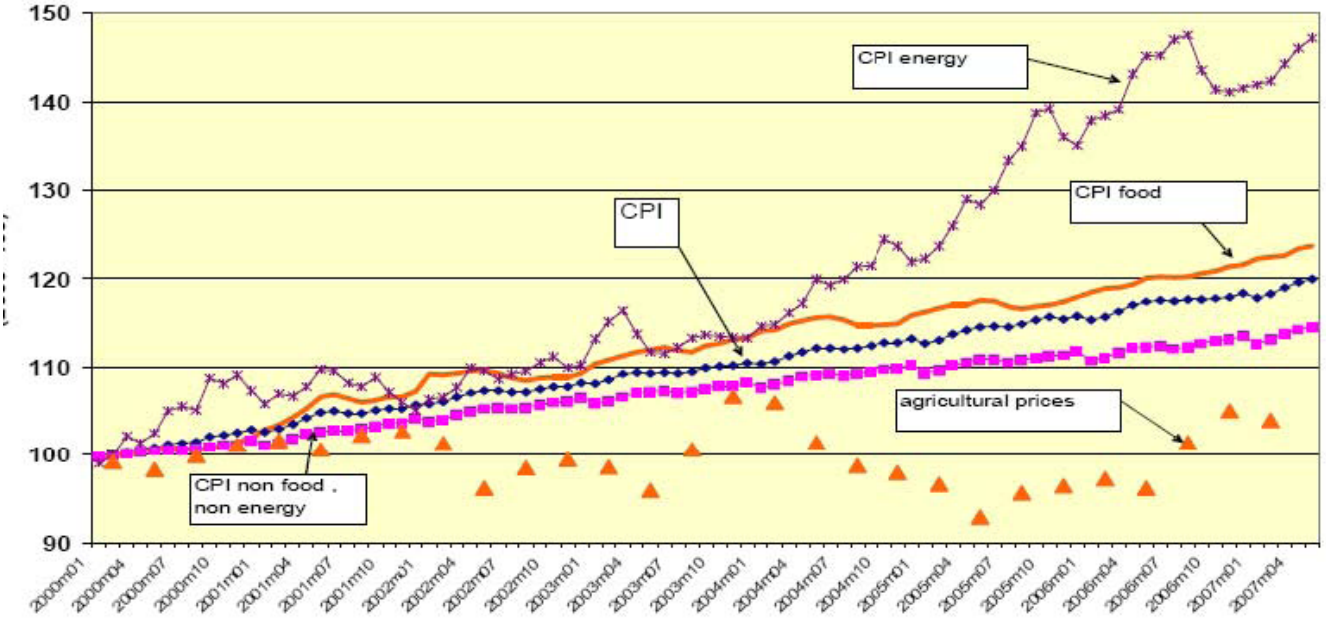


Figure 6 above demonstrates that agricultural prices tend to fluctuate cyclically around a moderately stable trend whereas the Consumer Price Index (CPI) for food and non food has risen steadily. The Centre for Agricultural and Rural Development at Iowa University utilised a multi-product, multi-country, deterministic partial equilibrium model to evaluate the impact of US ethanol production and its impact on planted acreage, crop prices, trade and retail food costs. The study concludes that ethanol expansion will cause a retail food price increase; it predicts that in the long run, general food prices will increase between 0.7 percent and 1.8 percent

8 - Emerging economies, increasing demand for food and food / fuel competition

The vulnerability of LDC with respect to traditional commodity dependence and sensitivity to price fluctuations is due to the combined threat from falling commodity prices, the slowdown in global demand and the contraction in financial flows. As a result, manufactures and service exporters (mostly Asian and island LDCs) are likely to be negatively affected, but the commodity-dependent economies (mostly African LDCs) will be hit even harder. In addition to the effects of the global economic crisis on their exports, developing countries, and especially the LDCs, suffered a severe shock in the first half of 2008 from the sharp rise in food and energy prices. There had already been a steady rise in prices from around 2000 but, between the last quarter of 2007 and the second quarter of 2008, non-fuel prices rose by some 50 per cent and crude oil prices by nearly 40 per cent. Prices have since then fallen sharply, although at the start of 2009 they were higher than in 2005. Moreover, the Food and Agricultural Organization of the United Nations (FAO) has reported that local food prices in most of sub-Saharan Africa and in many countries of Asia and Central America in the first quarter of 2009 were still higher than a year earlier. The food crisis of 2008, however, was in reality a sharp reminder of the precarious State of food supply in many parts of the world, not least in the LDCs, a situation that has been deteriorating for many years. Among the longer term influences on prices has been the collision between rising food demand in some of the largest emerging market economies with a relatively inelastic response of supply. It has long been UNCTAD's judgement that an effective strategy for growth and development, based on the creation of new comparative advantages and production capacities, cannot succeed unless agriculture is made more productive. Without a significant agricultural surplus, food security will remain

precarious and diversification of the national economy into manufacturing and other sectors will be undermined by rising food prices and wage costs. The medium and long-term problems of agriculture in the LDCs are considerable: (a) decades of neglect have left productivity in decline or stagnant; (b) there are growing population pressures on the available stock of productive land; and (c) there are also increasing pressures on the supply of land for food production from climate change and from incentives to switch to the production and export of biofuels. Reversing this trend will require, first, a firm commitment on the part of LDC governments to give high priority to agriculture in their development programmes and especially to increase the share of public investment in GDP. Their present capacity to deliver extension services to the agricultural sector and, more generally, to play a strategic role in national development, is very limited and needs to be reversed. In some LDCs, the gaps in such services are being filled not by the private sector but by non-governmental organizations and international organizations. For LDCs, the impact of the food crisis has been magnified by the global financial crisis and at some extend by the consequences of climate events, while the consequences of purchasing land for outsourced food production by non-LDC States is still under observation. Most LDCs face multiple challenges, such as the global fragility of multilateral trade, volatility of growth, liquidity and credit shortages, and vulnerability to natural disasters. Improved food security in LDCs could be realized through a combination of policies and measures, including the provision or enhancement of basic infrastructure, and the adoption of improved food production technologies and farming techniques. While agriculture is a major component of overall economic growth in most LDCs, the key policy challenge that most LDCs face is how to promote agricultural growth in a way that will enable a structural transformation, in which the relative importance of the agricultural sector declines as other sectors (particularly manufacturing) move onto a dynamic growth path.

LDC food and agriculture system that encompasses an integrated approach to improving productivity and efficiency at every stage of the commodity chains, from research and development to input markets, and from farm-level production and distribution to the final consumer. The development of linkages among these stages and to other sectors is key to achieving an optimal contribution from the agricultural and food system to broad-based economic growth and transformation through increased value-added and employment linkages. Integrating the commodity chain and encouraging productive relationships between farmers and private processors will also require the strengthening of rural producer organizations (e.g. farmers' groups, crop associations and cooperatives). The growing per capita income in emerging economies across the world, until 2007 would put upward pressures on demand of food. Higher income is associated with changes in diet habits leading to higher demand for relatively resource intensive foods (such as meat and dairy products). Furthermore, the income elasticity (which measures the responsiveness of the quantity demanded of a good to the change in income) of food products in emerging economies is higher than in developed economies. Different studies conclude that emerging economies have increased their food demand following the progress in per capita income For instance, the income elasticity of demand for food in countries such as Brazil and Egypt is double that of France and the UK.. However, there is little evidence of a significant acceleration in recent years; indeed, for China and India overall food demand seems to be rising somewhat more slowly than in the mid-1990s.

Biofuels: higher cereal and oilseed prices have been associated with a reduction in the available supply for food due to biofuel production (for instance, a senior UN official called the increasing use of crops for fuel rather than food a crime against humanity). Other things being equal, additional demand for biofuels would push the price of cereals and oilseeds. However, it is important to put the overall price effect into perspective. Whereas wheat prices have seen the most dramatic rise amongst all the cereals, the use of wheat for biofuels production is modest (as it was observed for the EU in 2007 with only 1.4 percent of wheat used for biofuels in the EU and 0.6 percent globally20). It is therefore unlikely that biofuel demand for cereals in the EU is the main responsible of wide cereal price fluctuation. By contrast, the US projected ethanol use of maize almost doubled between 2005/06 and 2007/08, and it is forecast to exceed or 100 million tonnes) in 2009/10, reaching almost 38 percent of total US domestic maize use.

Analysis performed by the European Commission suggested that cereal price increases "were further reinforced by the bioethanol boom in the US, which influenced the market only punctually and most notably in the maize markets. There is some evidence of the impact of increased bioethanol production on the soybean market, suggesting a trade-off between maize and soybean production. For instance, in 2006 farmers responded to market signals by reducing maize acreage in favour of soybean, and the reverse happened in 2006-07, suggesting that increased demand for maize due to increased ethanol production may have had an indirect effect on the price of soybeans.
In market fundamentals though the impacts of increased biofuels demand in the current market are smaller relative to the weather related factors outlined above. In 2006/07, for example, the combined cereal supply shortfall of North America, Europe and Australia was over 60 million tonnes, nearly four times larger than the 17 million tonnes increase in cereal use for ethanol in these countries.

9 - Impact of higher commodity prices on developing countries

Three of every four poor people in developing countries live in rural areas and most depend on agriculture for their livelihoods. Promoting agriculture is therefore imperative for meeting the Development Goal of halving poverty by 2015. At present, evidence that biofuels are leading to food price increases is only circumstantial (Mayat 2007, Gidley 2007, Blas 2007).
The FAO estimates that developing countries' import bills will increase by 10 percent between 2007 and 2008 and even more in 2009; some recent reports have attributed this increase to increased biofuel production but, biofuel demand has not been the main driver behind the current increase in commodity prices. It is also worth mentioning that while the import bill has increased, the export bill has also risen.
Of the main staples – rice, wheat and maize, only maize is currently used in significant quantities for ethanol production while the wheat has experienced the largest price increase. The prices of these grains tend to move together, indicating that they are substitutes in some markets. Thus at the global level, at least, consumers should respond to any shortage in the supply of maize by increasing consumption of rice or wheat. Moreover, Hazel et al. (2005) argue that there is an imperfect transmission of world prices to domestic prices.
Higher commodity prices are likely to have various effects on developing counties, and the effects will vary according to the level of economic development, social and environmental conditions. Countries that have the largest endowment of under-utilised lands are in the developing world, especially in Latin America, Russia and Africa. Putting the land into production will require a type of infrastructure that usually crowds in with other forms of investment (such as transport, sanitation and water facilities). Biofuel production has the potential to make those infrastructure investments socially profitable and thus to promote overall economic development. In order to analyse the impact of bioenergy on food security, the FAO has recently developed an analytical framework which allows governments interested in entering the bioenergy sector to calculate the effect of their policy decisions on the food security of their country on the basis of inputting country-specific scenarios. This framework will provide the tools to assess the potential costs and benefits of biofuels for developing countries.

10 - Implications of the increase in energy crop demand

Commodity market models are not yet designed to model biofuels as endogenous factors. Work is under way by international research organisations (such as the OECD) to develop models that bring together biofuels production, trade and the interrelationship between biofuels and commodity markets. Some of the difficulties encountered by current models relate to the fact that they are traditionally related to historic data while biofuel production and trade are a relatively new phenomenon with a lot of financial interactions suggesting that the interaction between biofuels and feedstocks market have not yet been developed in formal models.

In theory, in the longer term, increased demand for biofuels could potentially have a significant impact on crop patterns. Below an account is given of recent analytically oriented research on the extent to which higher biofuel production would result in an increase in commodity prices.
A recent OECD study suggests that the three OECD regions, the US, Canada and EU15, would require between 30 percent to 70 percent of their respective current crop area if they are to replace 10 percent of their transport fuel consumption by biofuels, assuming unchanged production technologies, feedstock shares and crop yields, and in the absence of international trade of biofuels or use of marginal fallow land. Brazil on the other hand, would only require 3 percent of its land in order to replace 10 percent of its transport fuel. For the world as a whole, 9 percent of cereals, oilseeds and sugar land would be required in order to achieve a 10 percent biofuels share of transport fuel. Whilst these figures are indicative rather than definitive, they reinforce the message that international trade, rather than national self-sufficiency is likely to be the key to achieving renewable energy obligations.30 Finally, the OECD-FAO outlook suggests that increased feedstock demand for biofuel production may keep prices above historic equilibrium levels during the next 10 years. For example, the wheat price is projected to be around $250 and $180 between 2007 and 2016 or between 18 and 25 percent higher than the average for 2001/02 and 2005/06 but significantly lower than prices in early 2008 which were over $350/tonne. The report points out that there are a number of uncertainties in relation to biofuel markets and how important they will prove to be in underpinning prices in agricultural markets in the future.
The OECD study estimates that the commodity price impacts of higher oil prices and increased demand for biofuels (relative to constant biofuel production) are likely to be more significant for vegetable oil (20 percent) and sugar (60 percent) than for cereals (4 percent). However, recent decrease in world sugar prices despite increasing oil prices and bioethanol production suggest that the relationship is not straightforward. The assumptions underpinning the model used in this analysis are: no trade in biofuels, that all biofuel is produced from food feedstocks and constant technologies for the projection period.

11 - Conclusions

The biofuel programmes in developed and developing countries are closely linked to the potential expansion of feedstock production and to the impact that this expansion may have on production structure of the producing countries and on global agricultural market trade. The recent increases in cereal prices appear to have more in common with poor harvests and stock changes rather then structural change in demand. Different studies have attempted to estimate the future impact of increased biofuel production on commodity prices. The OECD suggests that effects of IKAR (2007). Global demand for biofuels is likely to be more significant for vegetable oil and sugar. However, recent decreases in world sugar prices despite increasing oil prices and bioethanol production suggests that the relationship is not straightforward. While such studies provide a useful benchmark they assume that all biofuels is produced from food-crops, no trade in biofuels and constant technology. More research is needed and is being carried out to improve the understanding of the biofuel demand on commodity prices. Work is already under way to improve the models that are used to assess the impact of biofuel demand on agricultural commodity markets (for example by OECD and researchers using general equilibrium models). The Government has commissioned the Renewable Fuels Agency (RFA) to consider some of the existing evidence gaps around biofuels use and production. The RFA-led review will examine the impacts of rising demand for biofuels upon land use and specifically effects upon the net greenhouse gas (GHG) savings, taking into account potential direct and indirect land changes. The review will aim to put the impacts of biofuels into perspective, by quantifying the extent to which demand for biofuels is adding to pressure on available land resources and driving increasing food commodity prices and food insecurity for the most vulnerable members of society.
More research is also needed in order to understand the potential costs and benefits of biofuel production on food security and agricultural development more generally under different policy options (e.g. regarding the incentive to use by-products either for animal feed or energy).

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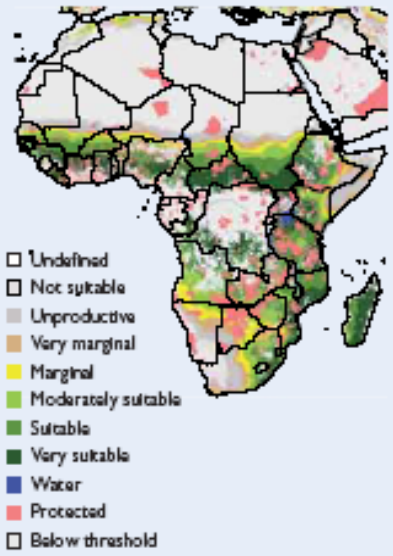
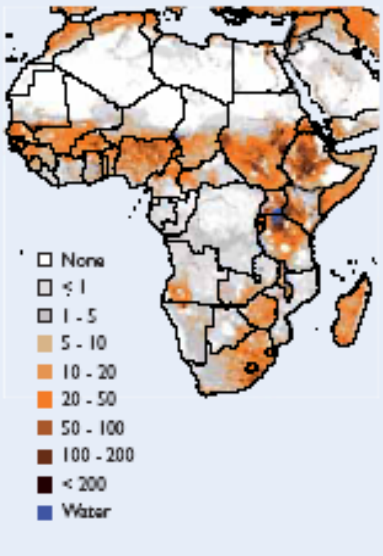
Figure 18a:
Bio-productivity of grassland and woodland



Source: IIASA Options (2008)

Figure 18b:
Density of ruminant livestock



Source: www.fao.org