European Commission

Directorate-General for Agriculture and Rural Development

PROSPECTS FOR AGRICULTURAL MARKETS AND INCOME IN THE EU 2011–2020

December 2011

NOTE TO THE READER

World agriculture is at a crossroads, facing an increase in the level and volatility of agricultural prices not seen since the 1970s, a stronger influence from factors outside of agriculture, such as macroeconomic shocks or the co-movement of agricultural with energy and other commodity markets, and major climate-related uncertainties. In such an environment, the development of medium-term projections for EU agricultural markets required some significant changes in approach, which are reflected in the present publication.

The outlook presented herein consists of a set of market and sector income prospects elaborated on the basis of specific assumptions regarding macroeconomic conditions, the agricultural and trade policy environment, weather conditions and international market developments. As in previous years, these are not intended to constitute a forecast of what the future will hold, rather they describe what may happen under a specific set of assumptions and circumstances, which at the time of projections were judged plausible. Thus, they should be seen as an analytical tool for medium-term market and policy issues, not as a forecasting tool for monitoring short-term market developments.

These projections and analyses have been carried out on the basis of economic models available in the European Commission (at the Directorate- General for Agriculture and Rural Development (AGRI) and in the Joint Research Centre – Institute for Perspective Technological Studies (IPTS)). This report is based on the information available at the end of September 2011, except for macroeconomic assumptions, which are from November 2011. The changes in legislation proposed or adopted since that date have not been taken into account. Moreover the projections do not take account of any potential outcome of ongoing bilateral/regional/multilateral trade negotiations. The analysis covers the period between 2011 and 2020.

With the adoption of a new approach and improved methodology last year, the medium term prospects for agricultural markets and income in the EU cover an extended time horizon (the next decade) and product detail (including biofuels, detailed oilseed complex and whole milk powder). The market outlook is presented in part I. To take account of the challenges outlined above, the outlook also focuses on the identification and quantification of the main areas of uncertainty, whose potential impact is analysed in part II.

The modelling approach has been further improved by increasing the number of market and modelling experts involved and by relying on state-of-the-art agro-economic models. The validation procedure included an external review of the baseline and uncertainty scenarios in a workshop on 25-26 October 2011 in Brussels, gathering high-level policy makers, modelling and market experts from the EU, the United States and international organisations such as the Organisation for Economic Co-operation and Development, the United Nation's Food and Agriculture Organisation and the World Bank.

These changes aim at enhancing the accuracy, usefulness and relevance of baseline market prospects, thus enabling the projections and analyses presented in this publication to provide useful up-to-date input into the debate following the Common Agriculture Policy towards 2020 legislative proposals.

The publication involved joint efforts by AGRI and the JRC-IPTS. While the authorship and responsibility for the contents of the publication rest with AGRI, acknowledgement is due to the staff at the IPTS working on the modelling background and baseline projections, as well as the uncertainty scenarios in Part II of the publication.

EXECUTIVE SUMMARY

Agricultural market developments have attracted considerable attention recently, due to increasing consumer food prices and sharp short-term price fluctuations of agricultural commodity prices. This medium term outlook provides a projection for major EU agricultural commodity markets and agricultural income until the year 2020, based on a set of coherent assumptions.

Under the assumptions made, agricultural commodity prices are expected to stay firm over the medium term, supported by factors such as the growth in global food demand, the development of the biofuel sector and a prolongation of the long-term decline in food crop productivity growth. High prices at world level would support EU agricultural exports in spite of the decline in competitiveness, particularly with the assumed appreciation of the EUR.

EU commodity markets are expected to remain balanced - on average - over the outlook period, without the need for market intervention. Prospects for agricultural income display a small growth rate at EU level after 2011, resulting from continuing decline in labour input rather than from income increases at sector level.

Policy and macroeconomic assumptions

The present medium-term outlook for EU agricultural markets and income is based on a *status quo* assumption for agricultural and trade policy. The Common Agricultural Policy (CAP) is assumed to follow the Health-Check decisions and global trade policy is assumed to respect the Uruguay Round Agreement on Agriculture. Macroeconomic assumptions include a low EU GDP growth in 2012 of 0.6% and thereafter a return to a modest growth of about 2% per year, and a steady appreciation of the EUR to around 1.50 USD/EUR in 2020.

This outlook, however, remains subject to a number of uncertainties regarding future market developments, as well as the macroeconomic and policy settings. Part II of this publication presents a selected analysis of alternative macroeconomic assumptions, as well as the impact of a policy-driven slow down in economic growth in China in order to curb price inflation. Furthermore, the impact of yield variations, e.g. due to weather conditions, and the impact of increasing production costs in the EU is examined.

Other factors, such as future changes in agricultural and trade policies, e.g. with a possible agreement within the current Doha Development Round negotiations and/or in bilateral/regional trade discussions, or renewable policies could have far reaching implications for the future pattern of EU agricultural markets.

Arable crops

The medium-term prospects for EU cereal markets are characterised by tight market conditions, low stock levels and prices remaining above long term averages. These developments are driven by moderate supply growth reaching 305 mio t by 2020, mainly the result of low yield growth rates (0.5% per year on average), and an increase in the domestic use of cereals in the EU, most notably due growing demand by the ethanol and biomass industry in the framework of the 2008 Renewable Energy Directive (RED). Some reallocation between crops in the context of a stable overall cereal area is expected, with maize and soft wheat further increasing their share (up to 16% and 39% respectively) at the expense of other cereals, notably barley which drops to 21% or total cereal area.

Similar drivers impact upon the medium-term prospects for the EU oilseed markets, which show a positive outlook for producers with strong demand and high oilseed oil prices. Supply

growth is expected to result from moderate yield growth and to a lesser extent from a slightly expanding oilseed area. The expected increase in domestic use of oilseeds in the EU would also be driven by additional growth of the biodiesel and biomass industry following the initiatives taken by Member States in the framework of the RED. The trade balance is not expected to improve over the medium term as additional imports are required to meet the biofuel targets.

The medium-term prospects for EU sugar markets are mixed. The growing demand for ethanol in the framework of the RED supports a growth in sugar beet production geared towards ethanol. On the other hand, for food consumption, isoglucose is expected to increasingly replace beet sugar, following the expiry of quotas in 2015.

Overall, the projected growth in domestic consumption of cereals, oilseeds and sugars is largely dependent on the assumptions for bioenergy use.

Meat

EU total meat production is expected to continue its recovery over the outlook period from the decline suffered in 2008 and 2009, and is expected to show a further moderate increase of 2.4% by 2020. The outlook differs between ruminants and non-ruminants, as beef/veal and sheep/goat meat production is estimated to drop by 1.3% and 7.9% respectively between 2011 and 2020, while pig and poultry meat production would expand by 3.6% each.

The driving factor for production growth is the increasing poultry and pig meat consumption. EU total meat consumption per capita would reach 83 kg in 2020 which corresponds to a slight increase compared to 2010. Poultry meat consumption would increase most, followed by pig meat. Pig meat is expected to remain the preferred meat in the EU with 41.6 kg per capita consumption in 2020, compared to 23.6 kg for poultry, 15.8 kg for beef/veal and less than 2 kg for sheep and goat meat.

The net trade position of the EU is projected to deteriorate over the outlook period, driven by an increase in meat imports (of beef/veal, sheep and goat and poultry meats) and a parallel decline in exports of poultry. Aggregate meat imports and exports would grow by 6.1% and 1.9% respectively, leaving the EU as a net exporter of pig and poultry meats in 2020.

Milk and dairy products

Medium term prospects for dairy markets appear favourable. Continued expansion of world demand, resulting from global population and economic growth, combined with increasing preference for dairy products (also as a result of growing per capita consumption) are expected to be the main drivers. Sustained import demand, particularly from emerging countries, would have a positive impact on dairy commodity prices, thus fuelling EU export potential. Nevertheless, EU market shares are projected to deteriorate for most dairy products (but stay rather stable for milk powders), due to the assumed strengthening of the EUR that limits the competitiveness of EU exports.

EU milk production is expected to grow moderately, showing a cumulative increase of 7% for the period 2009 to 2020. This increase comes as a result of a slightly higher growth rate for milk quantities delivered to dairies and a continuous decline of production for on-farm use.

Projections for cheese and fresh dairy products are quite positive. EU production of fresh dairy products (including drinking milk, cream, yogurts, etc) is projected to increase by about 6% (from 2009 to 2020) and cheese by almost 10%. Demand prospects on both the domestic and world markets look positive, and despite a strengthening EUR, substantial demand on the world market would allow for a progressive increase of EU exports. However, the EU will

gradually lose world market share, though it still account for around 27% of global exports in 2020.

Whole milk powder production in the EU is expected to stay relatively stable over the short term. The medium term prospects for exports are supported by an increase in world demand, led by China. The EU share in global exports is expected to decline gradually to 20% by 2020 (from 25% in 2009).

EU skimmed milk powder production is projected to increase by 10% throughout the outlook. A strong global import demand would contribute to a balanced market, driving a favourable outlook for exports. The EU would see its world market share improving by 4 percentage points over the period to reach 23% of global exports in 2020.

The outlook indicates continued market stability for butter, resulting from positive market conditions over the projection period, with prices at relatively high levels and firm EU demand.

Agricultural income

In 2011, agricultural income per working unit in the EU-27 increased for the second year in a row, thus further recovering from the significant low in 2009. Today, EU-27 agricultural income is roughly 25% higher than in 2000. It is expected to show further moderate cumulative growth over the 2011-2020 period so that by 2020 it would be around 9% above the 2007-11 average (base) level. This overall gain would mask opposite developments for the EU-15 and EU-12: whereas agricultural income in the EU-15 would show a slight decrease (-3.5%), it is foreseen to display a sharp growing trend in the EU-12, rising almost 35% above the base level by 2020, thus slightly converging towards the EU average. The assumed decline in agricultural labour remains an important factor behind the income prospects for both EU-15 and EU-12, with the increase in subsidies granted to agricultural producers in the EU-12 over the phasing-in period a key driver of income growth in this group of Member States.

Caveats

Despite the improvements in the economic model (modified version of the AGLINK-COSIMO from OECD/FAO) used to generate the market prospects, there are still some limitations that need to be addressed in future exercises (e.g. aggregation of demand for coarse grains and oilseed sector, developments in farm structure, or trends affecting other players in the supply chain such as the processing industry and the retail sector).

Notwithstanding the efforts to base the outlook for agricultural markets and income on the latest statistics and information, as well as the most plausible expectations on the future, the outlook presented in this publication has to be interpreted with caution due to the rapidly shifting global economic situation, which renders the underlying assumptions on the global market uncertain. Changes in these assumptions affect the interaction of the economic with the policy setting, and impact upon additional hypotheses linked to the income estimation, including those for sectors not covered by the model.

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List of acronyms and abbreviations

€	Euro currency
CAP	Common Agricultural Policy
DG AGRI	European Commission, Directorate-General for Agriculture
ECB	European Central Bank
EU	European Union
EU-27	European Union after the enlargement on January, 1st 2007
EU-15	Member States of the European Union before May, 1st 2004
EU-10	Member States that have joined the EU on May, 1st 2004
EU-2	Bulgaria and Romania
EU-12	All Member States that have joined the EU since May, 1st 2004
EUR	Euro currency
Eurostat	Statistical Office of the European Communities
FAO	United Nation Food and Agriculture Organisation
FDP	Fresh dairy products
FeedMod	Modelling tool to estimate feed use by the animal sector
G2	United States and European Union
G20	20 major economies
GDP	Gross Domestic Product
ha	Hectare
IGC	International Grain Council
kg	Kilogramme
mio	Million
OECD	Organisation for Economic Co-operation and Development
SMP	Skimmed Milk Powder
SRW	Soft Red Winter (Wheat)
t	Tonne
TRQ	Tariff Rate Quota
USA	United States of America
USD	US Dollar
USDA	United States Department of Agriculture
WMP	Whole Milk Powder

PART I Prospects for agricultural markets and income

1 Introduction – the baseline setting

This medium term outlook provides a projection for major EU agricultural commodity markets and agricultural income until the year 2020, based on a set of coherent macroeconomic and policy assumptions. The baseline assumes normal weather conditions, steady demand and yield trends and no disruptions caused by factors like animal disease outbreaks or food safety issues. This stable path in assumed exogenous variable is reflected in the baseline projections, which depict rather smooth market developments; in reality, markets tend to move along a more volatile path as observed in the past and particularly over recent years.

Part I of this publication summarises the main results of updated baseline projections for the cereal, oilseed, meat and dairy product markets and agricultural income in the European Union for the period 2011-2020. Part II of the publication focuses on a set of uncertainties surrounding the baseline setting with a focus on the macroeconomic environment and the volatility of yield developments.

The projections are established under a set of assumptions on agricultural and trade policies and the macroeconomic environment as well as considerations for climate and animal disease related issues. The world market environment is based on the OECD-FAO agricultural outlook of June 2011, taking into account more recent global macroeconomic prospects. These working hypotheses have been defined on the basis of the information available, which at the time of the analysis was deemed to be most plausible. The projections are based on market statistics and other information available at the end of September 2011, while the macroeconomic assumptions are based on projections published in November 2011.

1.1 Policy assumptions

The present projections assume a status quo **EU policy environment** over the outlook period, i.e. a continuation of the Common Agricultural Policy (CAP) following the Health-Check decisions adopted by the Agricultural Council in November 2008. The following elements have particular importance regarding market and income developments:

(1) *Phasing out of milk quotas:* Milk quotas are increased by one percent every quota year between 2009/10 and 2013/14. For Italy, the 5 percent increase has been introduced immediately in 2009/10. Milk quotas are abolished by April 2015.

(2) *Expiry of the sugar quota system:* Sugar and isoglucose quotas are assumed to expire after the marketing year 2014/2015 as set out in the existing legislation.

(3) *Intervention mechanisms:* Intervention is set at zero for barley and sorghum. For wheat, butter and skimmed milk powder intervention purchases are possible at guaranteed buying-in prices up to 3 mio t, 30 thousand t and 109 thousand t respectively for each year. Beyond these limits, intervention is possible by tender.

(4) *Decoupling:* The payments that some Member States kept coupled after the 2003 CAP reform will be decoupled and moved into the Single Payment Scheme (SPS) by 2010 for arable crops, durum wheat, olive oil and hops and by 2012 for processing aids and the remaining products, with the exception of suckler cow, goat and sheep premia, where Member States are assumed to keep current levels of coupled support.

(5) The Member States currently applying the *single area payment scheme (SAPS)* are assumed to adopt the regionalised system from 2014 onwards.

(6) *Set-aside:* The requirement for arable farmers to leave 10 percent of their land fallow was abolished in 2008.

(7) *Modulation (shifting money from direct aid to Rural Development):* direct payments exceeding an annual EUR 5 000 shall be reduced each year by 7% in 2009 up to 10% in 2012. An additional cut of 4% will be made on payments above EUR 300 000.

Policy changes related to the European Commission proposals for a CAP towards 2020 as presented on 12 October 2011 have not been taken into consideration for the baseline projections. Concerning the sugar quota regime, the CAP towards 2020 proposal confirms the existing provisions on expiry of the regime after the marketing year 2014/15. The policy assumption on the expiry of sugar quotas therefore is in conformity with existing legislation.

Regarding the **trade policy environment** all commitments taken within the *Uruguay Round Agreement on Agriculture* regarding in particular market access and subsidised exports are assumed to be fully respected. No account is taken of any potential outcome of the multilateral trade negotiations within the framework of the Doha Development Round, or of ongoing bilateral and/or regional trade negotiations.

1.2 Macroeconomic environment

World GDP declined by 2.1% in 2009 but is projected to rebound by 4.2% in 2010. World GDP growth is also projected to accelerate, reaching 4.3% in 2014 and retract thereafter to 3.8% which is still relatively high.

As a consequence of the financial and economic crisis **EU GDP** contracted by 4.2% in 2009 but in 2010 the recovery was pronounced at 2.0%. In the current year 2011 and even more so in 2012, the prospects for GDP growth are rather low with an expectation of EU growth of 0.6% in 2012. EU GDP growth is projected to increase thereafter to reach 2.3% in 2015 but ease back gradually to 2.0% by the end of the outlook period.

Graph 1.1 illustrates the impact of the prolonged economic crisis which started in late 2008 and prevails with the current difficult situation regarding sovereign debt and credit availability and its implications for the EU economy. The graph also indicates the difference in macroeconomic expectations in March 2008, before the crisis erupted, and in October 2011.

The assumptions of the **macroeconomic environment** are presented in Table 1.1. They reflect expectations for slower growth in the short term economic environment, with the longer term economic outlook mostly assumed to follow a relatively stable path with respect to population growth, GDP and inflation trends. Due to the high level of uncertainty surrounding the macroeconomic outlook, most of the analysis in Part II of the publication focuses on the implications of alternative macroeconomic scenarios on the prospects for EU agriculture until 2020.

The macroeconomic assumptions used in the baseline have mixed implications on EU agricultural markets. Continuous population growth drives increasing demand and supports higher prices for agricultural commodities, while the expectation of lower short term economic growth limits income growth thereby reducing the potential for demand growth over the near term. In terms of EU export potential, the positive situation during 2010 and 2011 supported by favourable currency exchange rate developments is projected to weaken over the outlook, as the positive effects of higher GDP growth in importing countries would be dampened by worsening EU price competitiveness due to a continuous appreciation of the EUR. While the increasing price of crude oil could have positive implications on import demand from oil producing countries, the effect on agricultural input costs would be more pronounced, leading to higher energy, fertilizer and feed costs for agricultural producers.

Graph 1.1 Baseline assumptions on GDP growth and exchange rate developments

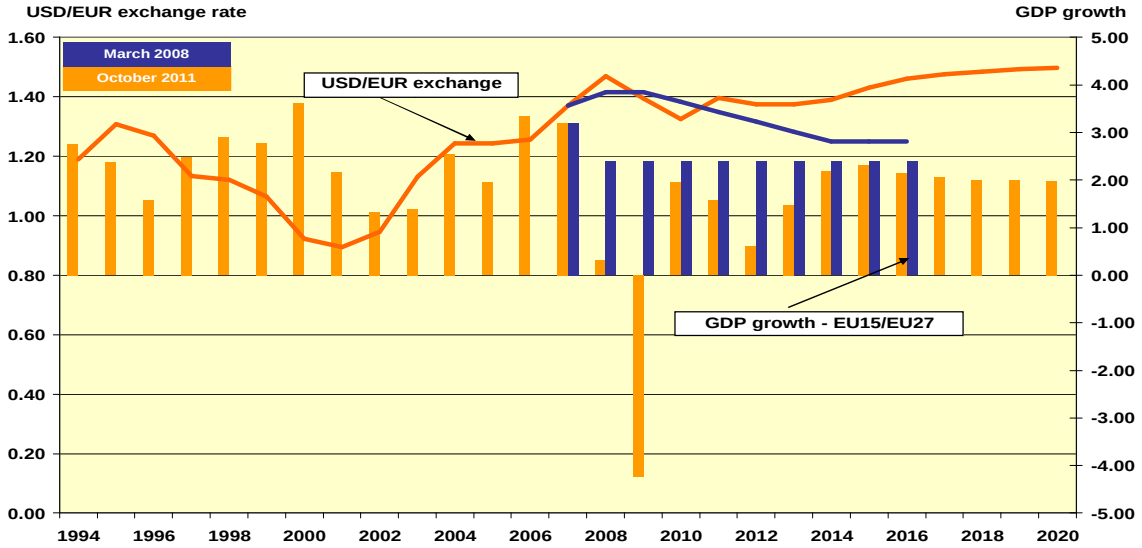


Table 1.1 Baseline assumptions on key macroeconomic variables, 2009–2020

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Population growth	0.3%	0.2%	0.3%	0.2%	0.2%	0.3%	0.3%	0.2%	0.2%	0.2%	0.2%	0.2%
EU15	0.4%	0.3%	0.4%	0.3%	0.3%	0.4%	0.4%	0.3%	0.3%	0.3%	0.3%	0.3%
EU12	0.0%	-0.1%	-0.1%	-0.1%	-0.1%	0.0%	0.0%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%
Real GDP growth	-4.2%	2.0%	1.6%	0.6%	1.5%	2.2%	2.3%	2.1%	2.1%	2.0%	2.0%	2.0%
EU15	-4.3%	1.9%	1.5%	0.5%	1.4%	2.0%	2.1%	1.9%	1.8%	1.8%	1.8%	1.7%
EU12	-3.7%	2.2%	3.1%	1.9%	2.7%	4.2%	4.3%	4.3%	4.2%	4.1%	4.0%	4.0%
World	-2.1%	4.2%	3.0%	3.0%	3.8%	4.3%	4.2%	4.0%	3.8%	3.8%	3.8%	3.8%
Inflation (Consumer Price Index)	1.0%	2.1%	3.0%	2.0%	1.8%	2.0%	2.0%	2.0%	1.9%	1.9%	1.9%	1.9%
EU15	0.7%	1.9%	2.9%	1.9%	1.7%	1.9%	2.0%	1.9%	1.9%	1.9%	1.9%	1.9%
EU12	3.2%	2.9%	3.8%	2.9%	2.8%	2.7%	2.6%	2.5%	2.5%	2.5%	2.5%	2.4%
Exchange rate (USD/EUR)	1.39	1.33	1.40	1.37	1.37	1.39	1.43	1.46	1.48	1.49	1.49	1.50
Crude oil price (USD per barrel Brent)	62	79	113	115	117	115	113	117	119	120	120	118

Source: DG AGRI, ECFIN, Eurostat

In 2011, the **EU population** surpassed 500 million but the rate of growth is continuously declining. This is foreseen to persist over the outlook period, with Eurostat projections (EUROPOP 2010) showing a steady decrease in annual population growth from 0.3% to 0.2% p.a. over the medium term, with a slightly higher growth rate in the EU-15 and a marginal decline in the EU-12.

The annual **inflation rate** averaged 1.0% in 2009, but increased to 2.1% in 2010 and is expected to top 3.0% in 2011. For the outlook period, EU (overall) annual inflation of 1.8% to 2.0% is assumed over the medium term.

Following a continuous strengthening of the EUR against the USD from 2001 to 2008, the EUR depreciated in 2009 and 2010, averaging 1.39 USD/EUR and 1.33 USD/EUR respectively. In 2011, the average exchange rate is likely to be higher at 1.40 USD/EUR. Developments in recent months indicate some depreciation of the EUR for 2012, but the **USD/EUR exchange rate** is assumed to appreciate slightly over the remainder of the outlook, to reach around 1.50 USD/EUR in 2020.

Having reached a peak in 2008, the **price of crude oil** dropped to an annual average of 62 USD/barrel in 2009; it has since increased again to 113 USD/barrel. The medium term projections indicate a rather stable nominal oil price at current levels of between 110 and 120 USD/barrel.

2 Arable crops

The medium-term projections depict a relatively positive outlook for the EU cereal markets as a result of firm world demand and corresponding price developments. These are driven by the biofuel market, which is the most dynamic demand factor, as EU feed and food cereal demand are expected to show only a marginal increase.

2.1 Recent market developments

Arable crop markets, like other agricultural markets, were subject to sharp price fluctuations over the last few years. The 2007-2008 surge in agricultural commodity prices resulted from a combination of structural and temporary factors. The following year they fell strongly to levels temporarily triggering intervention buying in the EU. Thereafter prices increased again and for some commodities even exceeded the peaks reached a few years ago. Compared to the peak in 2008, the reaction of agricultural production has, however, been less pronounced. Thus current prices are still relatively high but slowly declining.

2010/11 marketing year

Climatic conditions have been diverging for arable crops, with unusual weather conditions in spring and summer. Summer has seen high temperatures in Eastern Europe and Russia and abundant rain in Central and Northern EU, which affected harvest quality.

For the 2010 harvest, the EU cereal area declined by 3.9% in comparison with 2009/2010 to reach 56.2 mio ha. This area combined with average yield estimates of 5.0 t/ha would lead to a harvested production of 278 mio t, almost 15 mio t lower than the 2009/2010 harvest (about 11 mio t due to area decrease and 4 mio t due to yields contraction). EU-27 production of common wheat would stand at 128 mio t. Barley and maize production would reach 53 and 57 mio t, respectively.

With cereal imports at 13 mio t, the level of cereal availabilities – taking into account carry-over stocks - reached 343 mio t. Domestic demand including losses stood at 277 mio t, with animal feed at a reduced 168 mio t and ethanol utilisation at 9 mio t. Total cereal exports reached the high level of 32 mio t. Thus, total cereal ending stocks decreased by 17 mio t to 37 mio t. Intervention stocks declined by 5.4 mio t, with the remaining 0.6 mio t committed to the "most deprived persons" programme.

EU oilseed areas reached 10.9 mio ha in 2010/11, 0.2 mio ha higher than the previous high in 2009/10. Nevertheless, total oilseed production stood at 29.4 mio t, down by 1.3% from the record harvest in 2009/10, due to less favourable yields.

2011/12 marketing year

For the 2011 harvest, weather conditions in the North resulted in reduced autumn plantings and increased winter kill compared to previous years. Conditions in the Mediterranean region were mostly favourable, whereas warmer and dryer weather for most of April and May curbed the production potential in core cereal regions. Improved weather conditions allowed for maintenance of average yields in France, whereas wet harvesting conditions had strong impact on yields and quality around the Baltic Sea. The late summer and autumn weather conditions were favourable for yield development for maize throughout Europe.

The area cultivated under cereals is forecast to decrease by a further 1.2% in comparison to 2010/11, to reach 55.5 mio ha. The area under soft wheat is projected to be stable at

23.1 mio ha and the maize area is expected to increase by 6.8% to 8.7 mio ha. However, the reduction in total cereal area, combined with more favourable yield estimates, would lead to a harvested cereal production of about 277 mio t, almost unchanged from last year.

EU exports are expected to decline considerably to 21 mio t. Total domestic use including losses is expected to remain stable at 278 mio t, of which 167 mio t for animal feed and 11 mio t for ethanol production. On the basis of these forecasts, ending stocks would decrease by 5 mio t to reach 32 mio t, with no remaining intervention stocks.

EU-27 oilseed area in 2011/2012 is forecast at 11.3 mio ha (+3.5%). Nevertheless, total oilseed production would decline to 28.6 mio t (-2.8%), due to a continued contraction in yields.

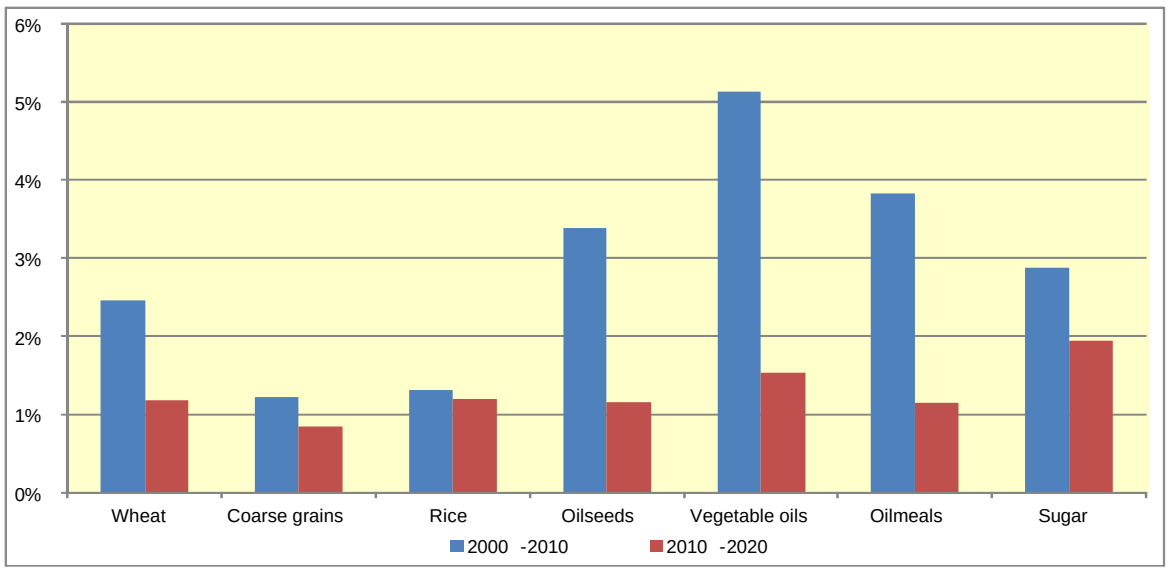
2.2 Market prospects

The medium-term projections depict relatively tight market conditions for the EU cereal markets due to the moderate prospects for yield growth and a gradual increase in demand driven by the emerging ethanol market.

World demand fuels prices for crops

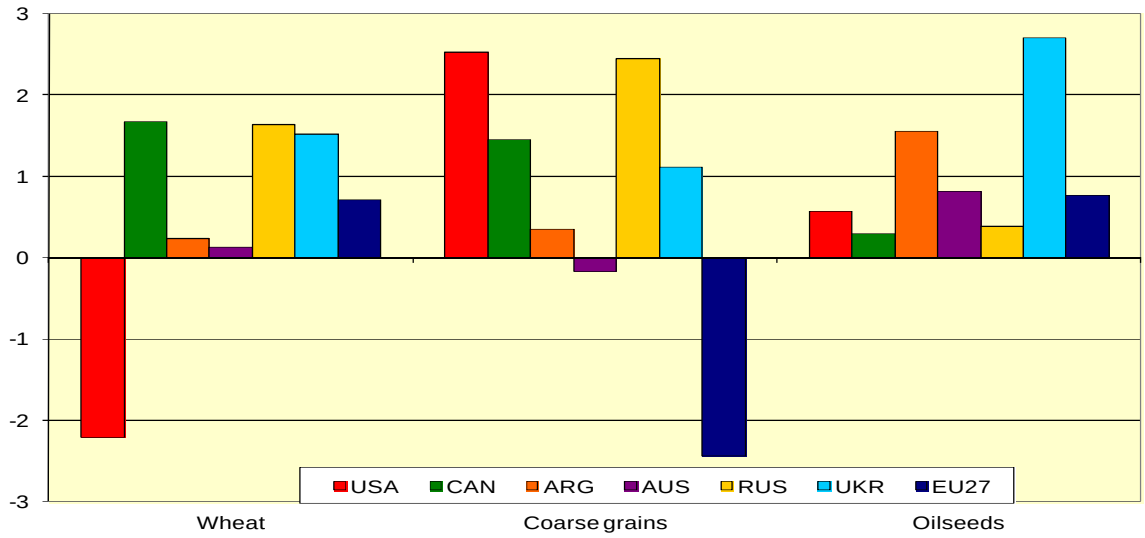
World demand for cereals, oilseeds, vegetable oils, oilmeals and sugars continues to increase although at a slower pace than in the previous decade (Graph 2.1). The slowdown in growth rates is more pronounced for wheat and oilseeds than for coarse grains, rice and sugar. The less positive short term economic prospects combined with a slowdown in population growth rates imply a slowdown in demand growth, in contrast to the continued prospects for a shift toward consumption of animal protein in emerging markets which supports demand.

Graph 2.1 World demand for crops and products – average annual growth (in percent)



Average yield growth is expected to trail slightly behind even this lower rate of demand growth so more land is required for arable crops. Thus, it can be expected that prices for agricultural commodities would remain high, which might result in somewhat faster yield growth in the medium term and a faster expansion of the EU crop area (Graph 2.2). For the main wheat, coarse grains and oilseeds exporting countries, especially in Russia, Ukraine and Canada, the crop area is expected to expand. In particular for Russia and Ukraine the previous season has been characterised by unstable supply due to adverse weather.

Graph 2.2 Change in area in main producing countries - 2020 compared to 2006-2010 (mio. ha)



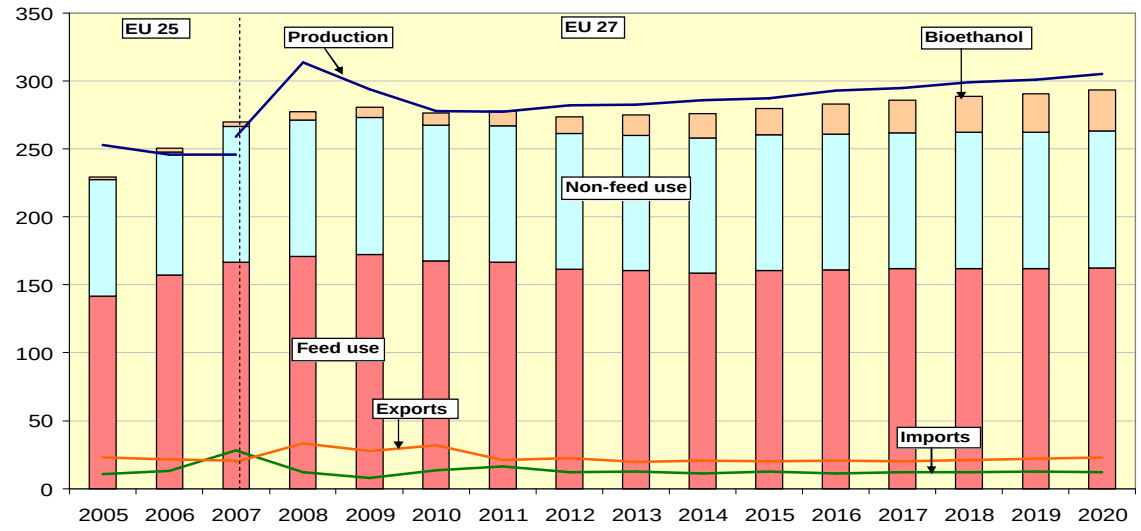
EU cereal markets

The medium-term projections for the EU cereals markets are characterised by relatively tight market conditions, low stocks and prices which are above the long term averages (Graph 2.3).

Supply growth is projected to result mostly from very moderate yield growth (approximately 0.7% per year on average) and some reallocation between crops within a quite stable cereal area in total.

The domestic use of cereals in the EU is projected to increase notably as a result of growth in the ethanol and biomass industry in the wake of the initiatives taken by Member States in the framework of the biofuel directive, the biomass action plan and the 2008 Renewable Energy Directive (RED).

Graph 2.3 Cereal market developments (mio t), 2005-2020



Note: The years indicted represent the marketing year N/N+1 (i.e. 2005 = 2005/2006)

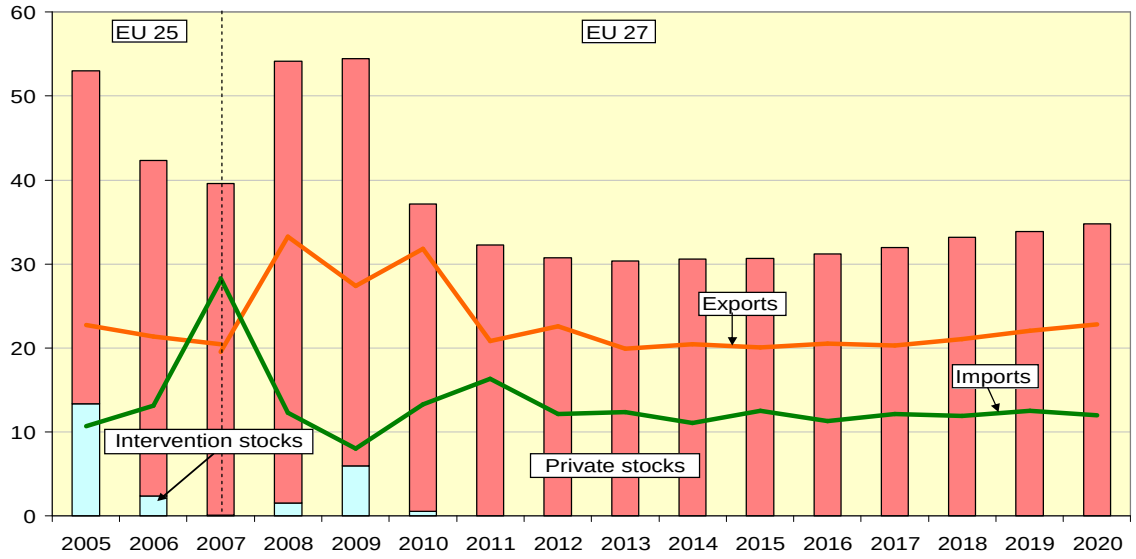
After the strong EU export performance of 2008-10, cereals exports are projected to remain at levels of about 20 mio t as relatively tight EU market conditions, sustained domestic prices and assumed exchange rate developments limit EU competitiveness on export markets.

The aforementioned developments on the internal and external markets should all result in relatively tight cereal markets over the medium term in the EU leading to prices in the range of 150 to 170 EUR/t over the medium term. These favourable price projections should be seen in a context of current and projected high production costs, driven largely by energy prices, and remain subject to a number of uncertainties, most notably with regard to the future climatic conditions on the supply side, and developments of the biofuel sectors in the EU and the US and the overall macroeconomic environment on the demand side.

EU cereal production is projected to recover over the medium term from the relatively low 2011 harvest of 278 mio t and exceed 305 mio t by 2020. Domestic consumption of cereals is also projected to keep growing over the medium term, mainly driven by the rapid growth in ethanol use, which is expected to triple over the next ten years and reach 30 mio t by 2020. Exports are projected to decline from 32 mio t in 2010 to about 20 mio t throughout the projection period, while imports should stabilize at 12 mio t.

Two consecutive and roughly equal low harvests of about 278 mio t in 2010 and 2011 led to a considerable reduction in EU stocks. It is expected that limited growth prospects for EU cereal production, which will just keep pace with the domestic demand growth, will result in stocks remaining at low levels (Graph 2.4). This tight market situation could leave the cereal sector exposed to any crop failure. Part II of this publication focuses on this risk and provides a quantitative assessment of the impact of yield variability on supply balances and prices.

Graph 2.4 Developments in cereal stocks and trade (mio t), 2005-2020



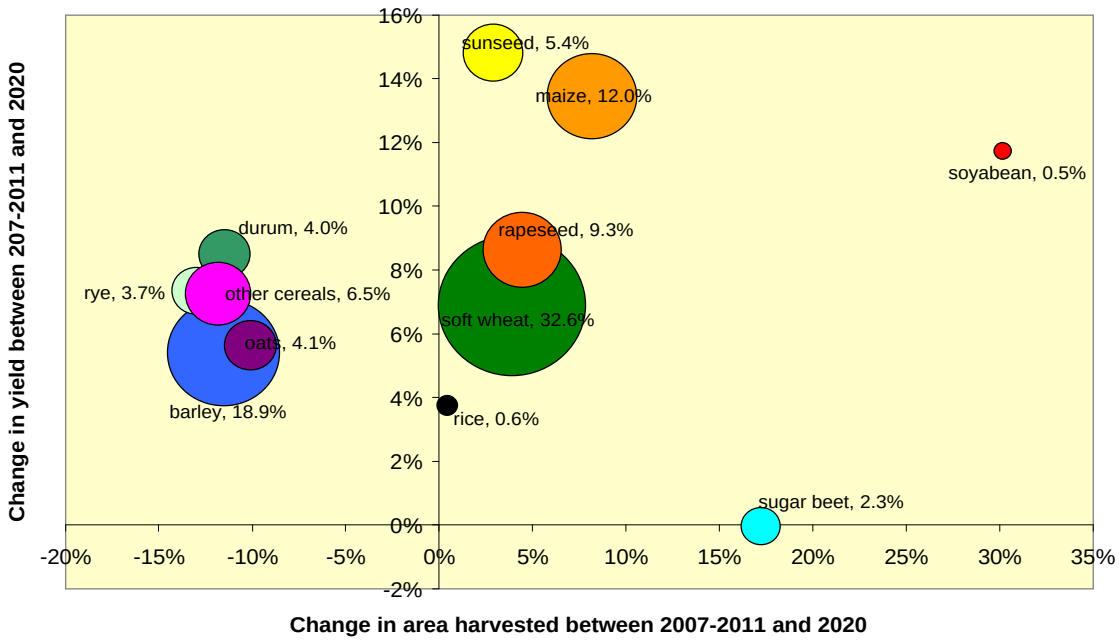
Note: The years indicted represent the marketing year N/N+1 (i.e. 2005 = 2005/2006)

The area shift between crops in the EU is expected to continue. In line with recent developments, soft wheat, maize, oilseeds and sugar beet are expected to gain, whereas other cereals are projected to lose share. Sugar beet area is the exception, with its increase due to its use as biofuel feedstock contrasting with its decline in recent years.

Graph 2.5 presents expected changes in area and yield and compares them to the area share. The horizontal axis indicates the change in area harvested between 2007-2011 and 2020 while

the vertical axis measures the change in yield over the same period. For example the maize bubble indicates that, with an initial 12% share of total area, gains are expected both in yield and in area growth (around 13% and 8% respectively).

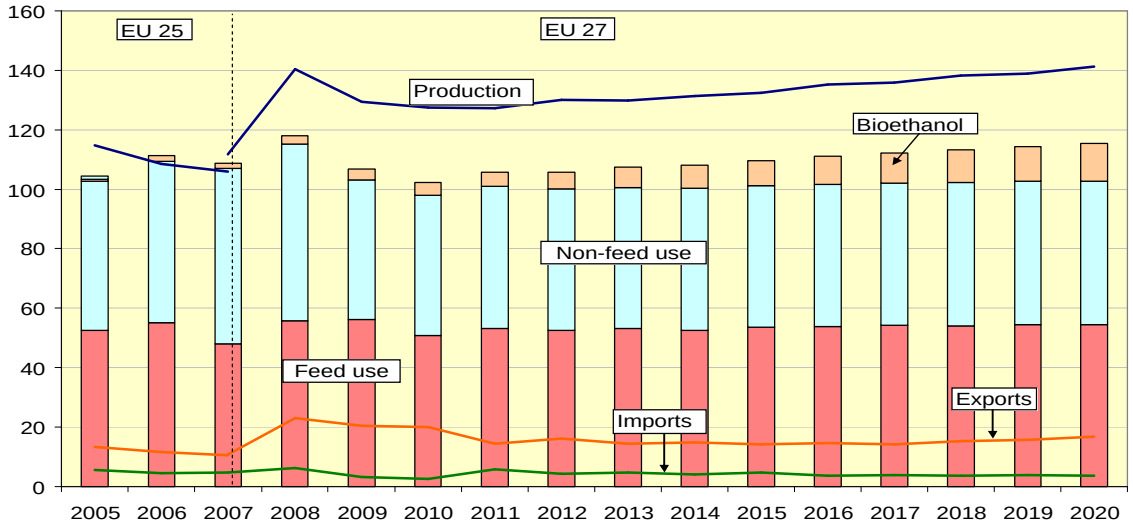
Graph 2.5 Changes in area and yields by main crops between 2007-2011 and 2020



Note: the size of the bubble represents the initial area share of all included crops in 2007-2011 (figure provided in percent)

Prospects for the three main cereals produced in the EU give a mixed picture, with a rather positive outlook for soft wheat and maize but limited growth for barley, the share of which continues to decline in the EU crop mix.[1]

Graph 2.6 Soft wheat market developments (mio t), 2005-2020

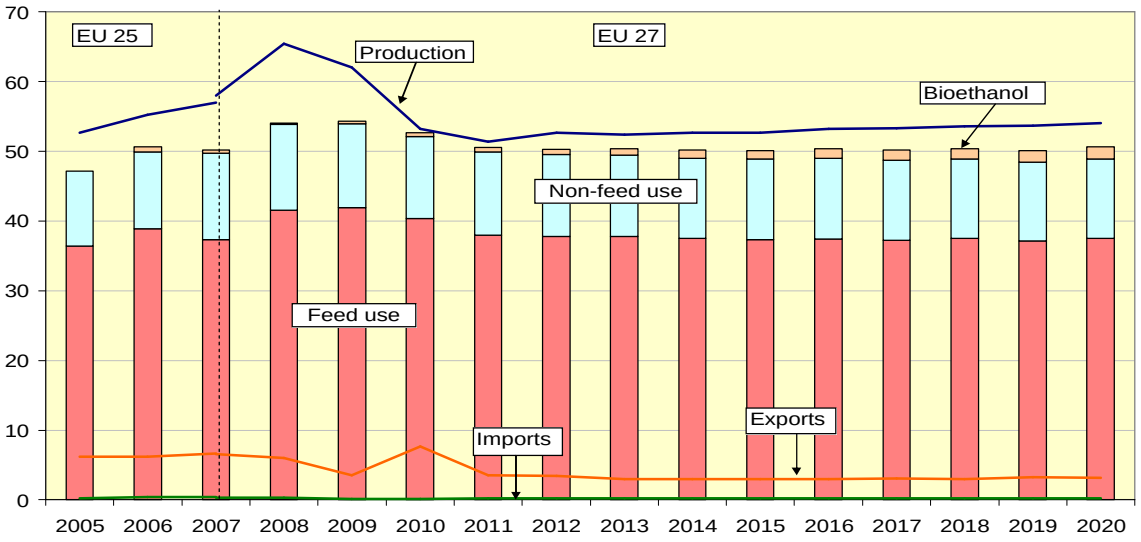


Note: The years indicted represent the marketing year N/N+1 (i.e. 2005 = 2005/2006)

1 As indicated earlier, the policy assumptions do not take into account the recent CAP towards 2020 proposals, including the provisions on greening, and more specifically the requirements of crop diversification and ecological focus area.

Soft wheat, which represents around 45% of total cereal production, is projected to reach 141 mio t by 2020, with domestic consumption almost equally split between feed and food uses (Graph 2.6). Demand for ethanol production, which currently represents 4% of total consumption, is projected to increase its share to almost 10% (12 mio t) by the end of the projection period.

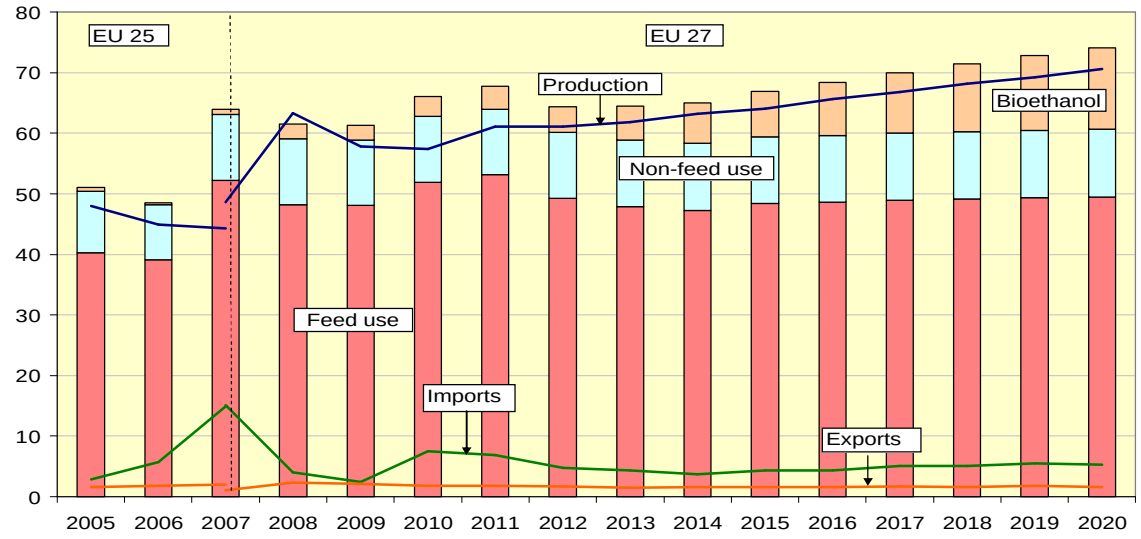
Graph 2.7 Barley market developments (mio t), 2005-2020



Note: The years indicted represent the marketing year N/N+1 (i.e. 2005 = 2005/2006)

After the sharp drop in 2010, EU **barley** production is projected to remain just above 50 mio t until 2020, with a marginal increase due exclusively to yield growth slightly outpacing the decline in area (Graph 2.7). Three quarters of domestic consumption, which is projected to remain constant, is destined for animal feed, with barley being a minor source of ethanol feedstock. Exports and stocks are also projected to remain constant, and at low levels, over the medium term.

Graph 2.8 Maize market developments (mio t), 2005-2020



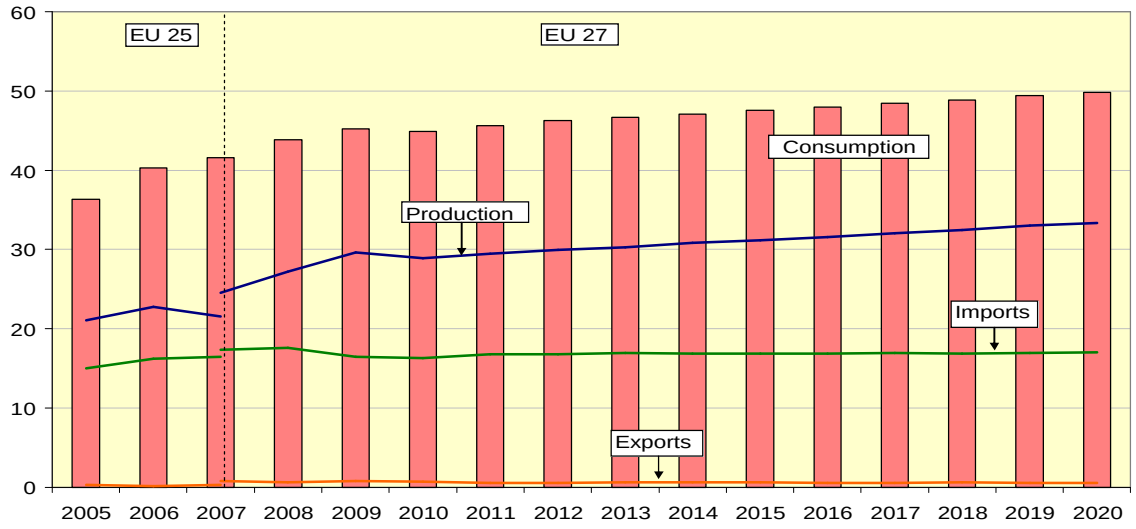
Note : The years indicted represent the marketing year N/N+1 (i.e. 2005 = 2005/2006)

Growing demand, partially due to the expanding use for ethanol production, is projected to support EU **maize** production (Graph 2.8). The latter is foreseen to increase over the medium term and reach about 70 mio t by 2020, establishing itself as the second cereal after soft wheat, at the expense of barley. Nevertheless, the EU will remain a considerable importer of maize throughout the projection period as demand continues to exceed domestic production.

EU oilseed-complex markets

The medium-term projections for the EU oilseed markets indicate a positive picture with strong demand and growing oilseed oil prices (Graph 2.9). Supply growth is projected to result mostly from moderate yield growth (0.6% per year on average) and to a lesser extent from unchanged oilseeds area from 2011 to 2020. Some minor area reallocation between crops is expected - 0.1 mio ha more rapeseeds and 0.3 mio ha less sunflower area.

Graph 2.9 Oilseed market developments (mio t), 2005-2020



Note : The years indicted represent the marketing year N/N+1 (i.e. 2005 = 2005/2006)

EU oilseed production, after the second successive low harvest of around 28.6 mio t, is projected to recover over the medium term and reach 32 mio t by 2020. Domestic consumption of oilseeds is also projected to keep growing over the period, mainly driven by the continued demand for oils in the bioenergy industry.

Rapeseed is the most important oilseed in the EU in terms of production, accounting for about two-thirds. This share drops to half in the case of oilseed use, mainly due to large imports of soybeans. With the expected shift in preferences towards oils instead of meals, rapeseed is also expected to gain share in EU oilseed use.

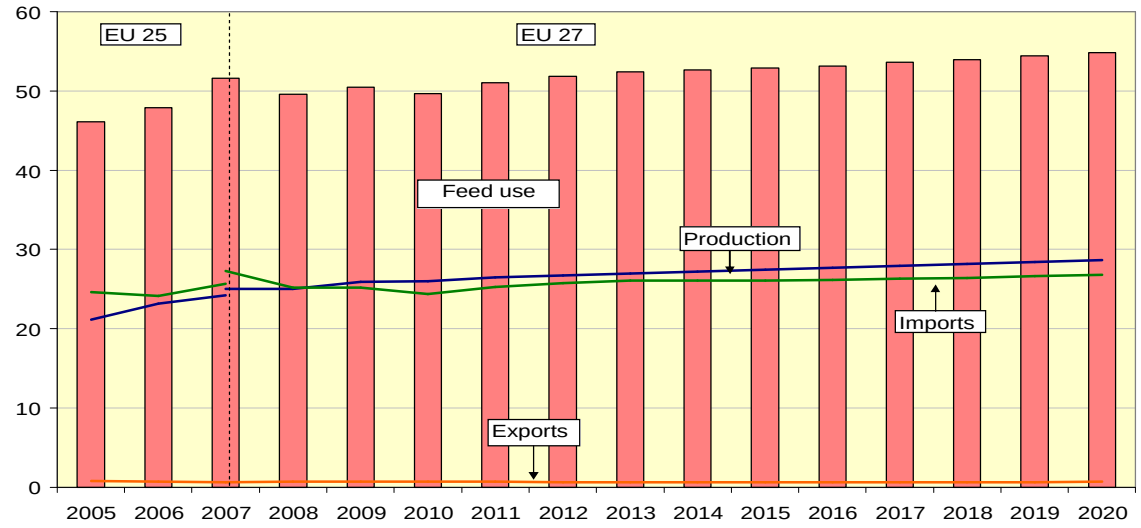
The EU is an important net importer of oilseeds, oilseed meals and vegetable oils. This trade balance is not expected to improve over the outlook as additional imports are required to meet biofuel targets.

However, as previously stated, uncertainties with respect to developments in the biofuel sectors of the EU and the US and the overall macroeconomic environment weigh heavily on the demand side of these projections.

The EU oilseed meal market is projected to show continued growth in both domestic production and in imported oilseeds and meals (Graph 2.10). Oilseed meals consumed by EU livestock and poultry are equally shared between domestically produced and imported meals.

This demand consists essentially of soybean meals (65% of total meals, 70% of which imported), and to a lesser extent rapeseed meals (25%) and sunflower seed meals.

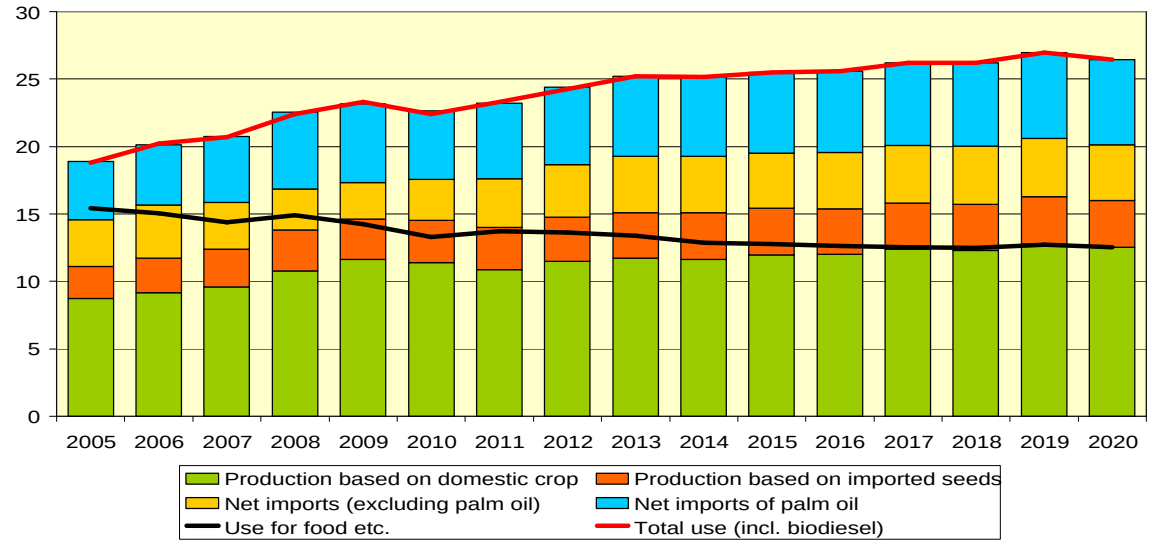
Graph 2.10 Oilseed meal market developments (mio t), 2005-2020



Note: The years indicted represent the marketing year N/N+1 (i.e. 2005 = 2005/2006)

Similar prospects are also projected for EU oilseed oil production (Graph 2.11), based on higher crushing of domestic oilseeds (mainly rapeseed and sunflower seed) but also of imported oilseeds (predominately soybeans). Oilseed oil imports are projected to remain low as imports take the form of grains/beans or biodiesel.

Graph 2.11 Vegetable oil market developments (mio t), 2005-2020



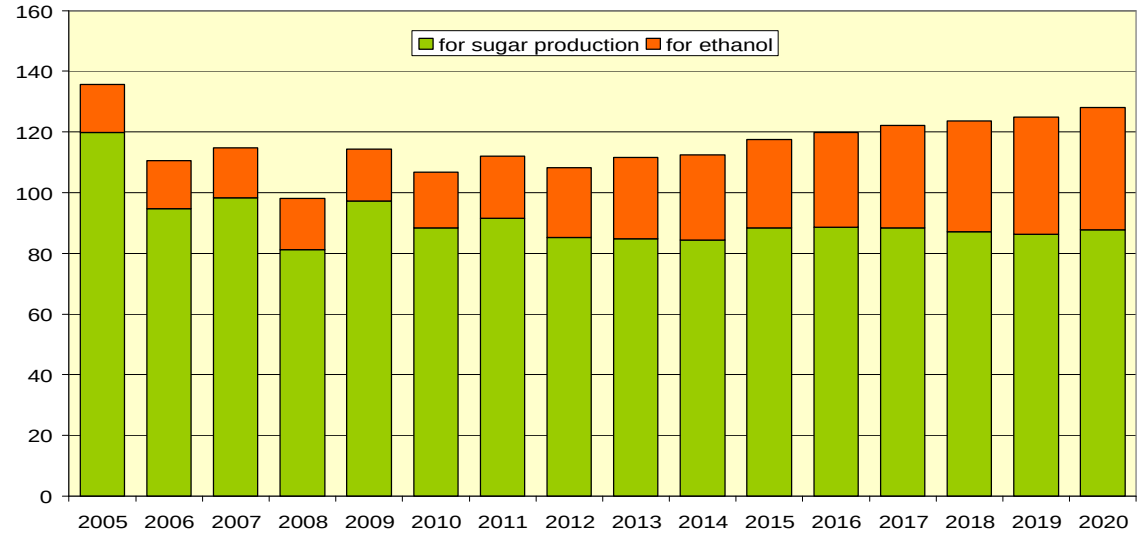
Note: The years indicted represent the marketing year N/N+1 (i.e. 2005 = 2005/2006)

The trade balance for oils worsens further when considering imports of other vegetable oils like palm oils and other minor oils (palmkernel, coconut, cotton and groundnut). Use of vegetable oils for biodiesel is expected to increase by about 50% over the next decade, and although this is lower than the corresponding increase for ethanol, it is nonetheless projected to reach 14 mio t by 2020. On the other hand food use in the EU, , is expected to decline slightly throughout the projection period from about 13 mio t to 12 mio t in 2020.

EU sugar market[2]

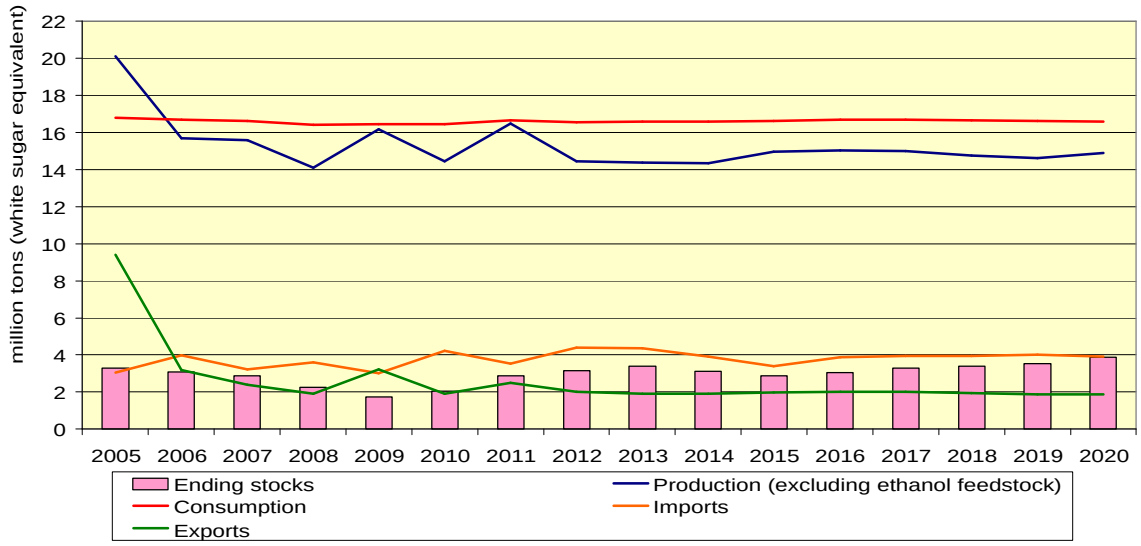
Projected developments in world prices and growing demand for ethanol, as well as the impact of the assumed end of the quota scheme, result in a projected sugar beet area expansion in the coming decade (Graph 2.12). With sugar beet one of the top feedstocks for ethanol production in the EU, the overall increase in demand for ethanol would lead to increased utilisation of sugar beet for ethanol. On the other hand sugar processing is expected to remain largely unchanged from its current level.

Graph 2.12 EU-27 sugar beet production by use (mio t), 2005-2020



Note: The years indicted represent the marketing year N/N+1 (i.e. 2005 = 2005/2006)

Graph 2.13 EU-27 sugar balance (mio t white sugar equivalent), 2005-2020



Note: The years indicted represent the marketing year N/N+1 (i.e. 2005 = 2005/2006)

2 The outlook for the EU sugar market is included for the first time in the DG AGRI baseline publication. The figures presented refer only to sugar and do not include other sweetener nor quantities reported as sugar destined for the production of ethanol. In addition, to simplify the model, carry-forward quantities are treated as normal stocks. In consequence, the figures presented in this publication may differ from data reported under the sugar chapter of the Single Common Market Organisation.

The market balance for sugar looks fairly steady over the projection period (Graph 2.13). Since the EU sugar reform, the EU has turned from a net-exporter into a net importer of sugar, and additionally, the world market price has exceeded the EU price over a number of occasions, as a dual effect of the cut in EU reference prices and the continuous (albeit volatile) increase in the world market price.

Despite the expectation of relatively high prices and the end of production constraints following the expiry of the quota system, it is projected that the net-trade position of the EU will not change much during the projection period. The overall demand for sweeteners is expected to increase slightly but this will be captured by sweeteners other than sugar, such as isoglucose, which should increase market share after the end of the sugar quota regime in 2015. Increases in the production of sugar will result in slight adjustments of domestic stocks as it is assumed that the international trade regime will remain unchanged.

EU biofuel markets

Cereals, sugar and oilseeds markets are increasingly affected by the development of biofuel markets. These markets are still strongly dependent on policies for their development. In the EU, the existing policy was reviewed in 2008 and the Renewable Energy Directive (RED) entered into force in 2009, setting out an overall binding target to source 20% of EU energy needs from renewables such as biomass, hydro, wind and solar power by 2020. As part of the overall target, each member state has to achieve at least 10% of their transport fuel consumption from renewable sources (including biofuels).

These policies are further elaborated in the Fuel Quality Directive. Together, the two directives set out sustainability criteria for biofuel production and procedures for verifying that these criteria are met. These criteria are currently under review and might be extended to include indirect land use changes (ILUC). The present baseline has to be seen against this background, and does not anticipate any changes which might have considerable effects on the EU biofuel markets.

The baseline assumptions for EU demand trends for gasoline and diesel consumption by the transport sector are based on the Primes 2009 model[3]. The energy share of biofuels is assumed to reach 9% in 2020, of which 8% consists of first generation and 1% second-generation biofuels. Consistent with the RED, the energy provided by the latter is counted as double for the purpose of meeting the 10% target. The outlook for ethanol and biodiesel demand, and their relative shares in fuel consumption is partly driven by the policies in force (differential tariffs and tax exemption rates), but mostly by the relative price competitiveness (production costs) of the two biofuels. Second generation biofuel production is assumed to have no land use implications.

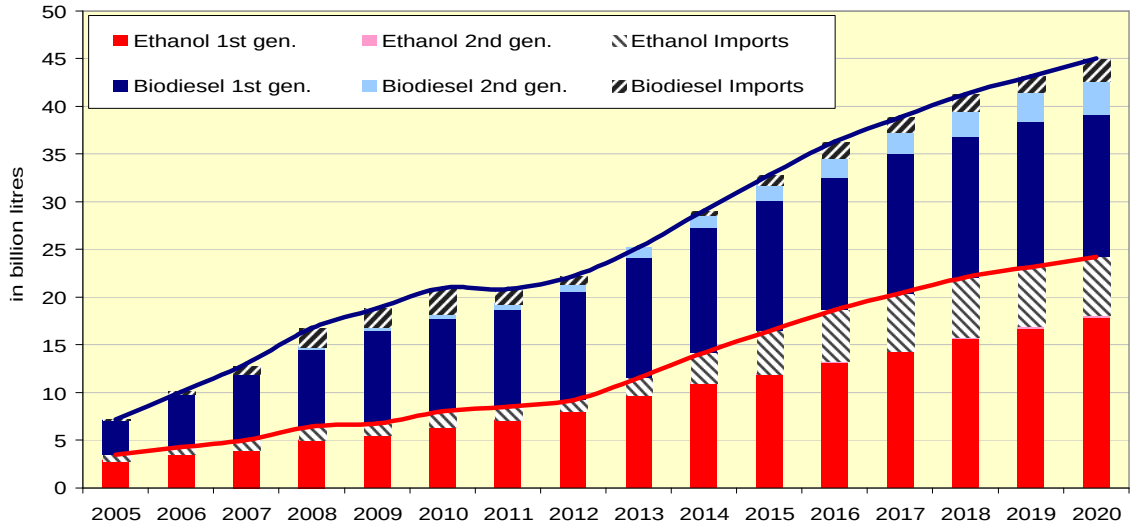
According to the projections, by 2020 ethanol energy shares would reach 11% of EU gasoline consumption while biodiesel would attain 8% of EU diesel consumption. These projections show a reversal of the current situation where biodiesel dominates EU biofuel markets and are in contrast with latest projections from Member States notified in the Renewable Energy Action Plans (REAP) .

Second-generation biofuels are assumed to grow from a low base throughout the projection period and to reach a share of 1% by 2020. This growth is expected mainly in biodiesel, mostly based on waste oils. Thus, biofuels based on biomass are not expected to have a noticeable impact on EU biofuel production. Net-imports will continue to play an important

3 http://ec.europa.eu/energy/observatory/trends_2030/doc/trends_to_2030_update_2009.pdf

role in the future, in ethanol rather than in biodiesel, despite the higher tariff protection of the former.

Graph 2.14 Composition of EU biofuel demand 2005-2020, billion litres

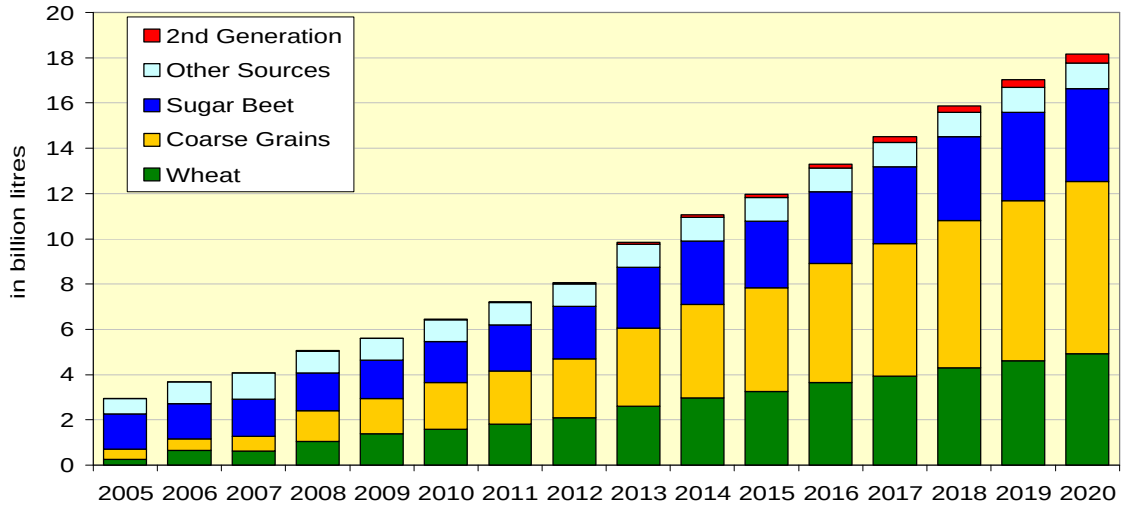


Note: Biodiesel 2nd generation is expected to be mostly produced from waste oils.

Graph 2.15 displays the outlook for ethanol production, which is expected to increase over the medium term. Even with this growth, however, EU production cannot keep pace with the expected growth in EU demand.

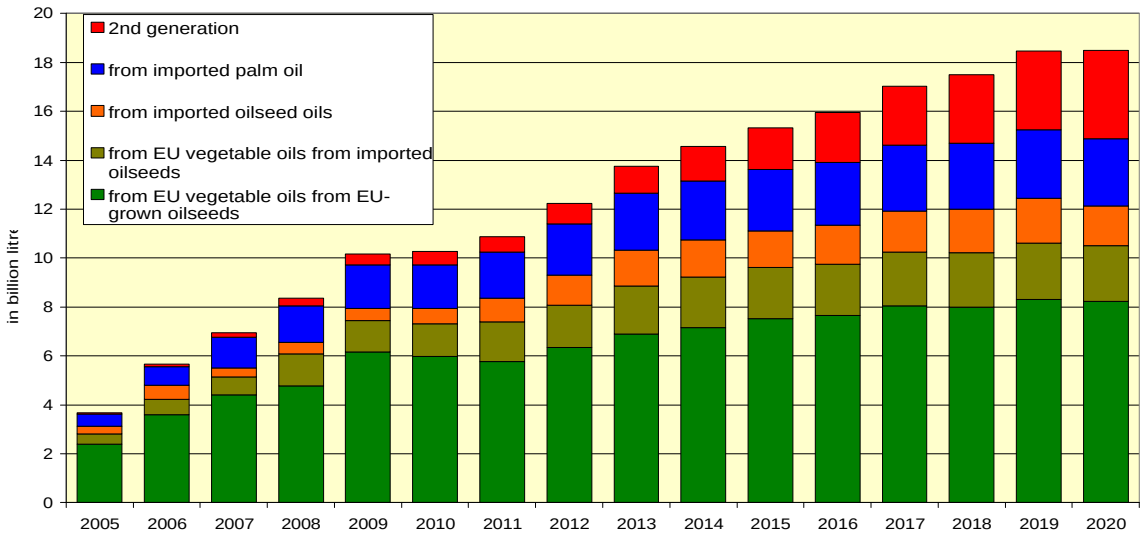
Wheat and maize would remain the major ethanol feedstocks (wheat especially in the short term), but sugar beet is also projected to increase throughout the outlook period.

Graph 2.15 EU ethanol production by feedstock (billion litres)



The increase in EU first generation biodiesel production is projected to follow a more gradual pattern. It has to be stressed that even biodiesel that is produced in the EU relies on substantial imports of raw material. A significant share of EU production is based on imports of vegetable oils as well as oilseed for domestic crush into oil (Graph 2.16).

Graph 2.16 EU biodiesel production by feedstock (billion litres)



Note: Biodiesel 2nd generation is expected to be mostly produced from waste oils.

3 Meat markets

Long-term prospects for EU meat commodity markets show a relatively favourable outlook for non-ruminants and a continued decline in the production of beef and sheep meat. Poultry meat consumption would show fastest growth, but pig meat would remain the most popular meat in the EU. Concerning trade, it is expected that the EU will remain a net exporter of pig and poultry meat over the outlook, in the context of the assumed economic and world market environment.

3.1 Recent market developments

EU meat demand declined throughout 2009 and meat import businesses were hit by weak demand, which reduced import volumes. In contrast, the EU meat market during 2010 was characterised by an increase in production and recovery in the EU net trade position.

Total meat production increased in both 2009 and 2010, with only sheep and goat meat displaying a continued decreasing trend. Sheep and goat as well as beef and veal meat production faced animal disease related constraints. Pig meat producers in particular have bore the brunt of high input costs as the pig meat sector faced a critical period between autumn 2010 and early 2011 due to a surge in feed prices and low pig meat prices, which severely affected profitability.

For the first time since 2003, the EU became a net exporter of beef (including live animal and meat products), following the strong increase in exports in 2010 and 2011. The increase was particularly strong for fresh and frozen meat exports to Turkey and Russia, while the traditional key markets such as the Middle East, China and Russia remained firm. The improved net trade position was boosted by a weaker Euro and the shortage of supply in traditional meat exporters as Brazil and particularly Argentina. This, among other factors, helped to improve EU export competitiveness in the context of a tight international beef market, with countries like Turkey considerably lowering import tariffs on bovine meat products.

3.2 Market prospects

The meat outlook faces a number of production-related uncertainties, mainly linked to rising production and investment costs and their financing, from the limited adjustment of the sector capacity to market volatility and from animal health related issues. In particular, prices for energy and protein feed components and other essential feed ingredients are expected to remain high.

Steady demand to drive world market perspectives

On the basis of current macroeconomic assumptions, aggregate world demand for meat is projected to recover from the setback induced by the economic crisis and world export of aggregate meats would go beyond the pre-crisis level by 2013. Over the long term, global meat exports would increase at an annual rate of around 2%, driven by strong poultry and pig meat exports and a modest growth in ruminant trade. Overall, meat exports would exceed the 2009 level by 22% by 2020, with pig meat at 31%, poultry meat at 26%, beef and veal at 14% and sheep and goat at 4% above the 2009 level.

The macroeconomic environment has mixed impacts on meat market prospects

The underlying macroeconomic assumptions suggest a weakening of EU export potential as the EUR is assumed to strengthen against the USD over the outlook (from 2013 onwards). On the other hand, the assumed economic recovery and continued population growth imply improved prospects for total meat consumption in the EU and worldwide. However, one of the most important factors determining meat production prospects is the gradual increase of the crude oil price through its impact on input costs (energy, fertilizer and feed costs in particular).

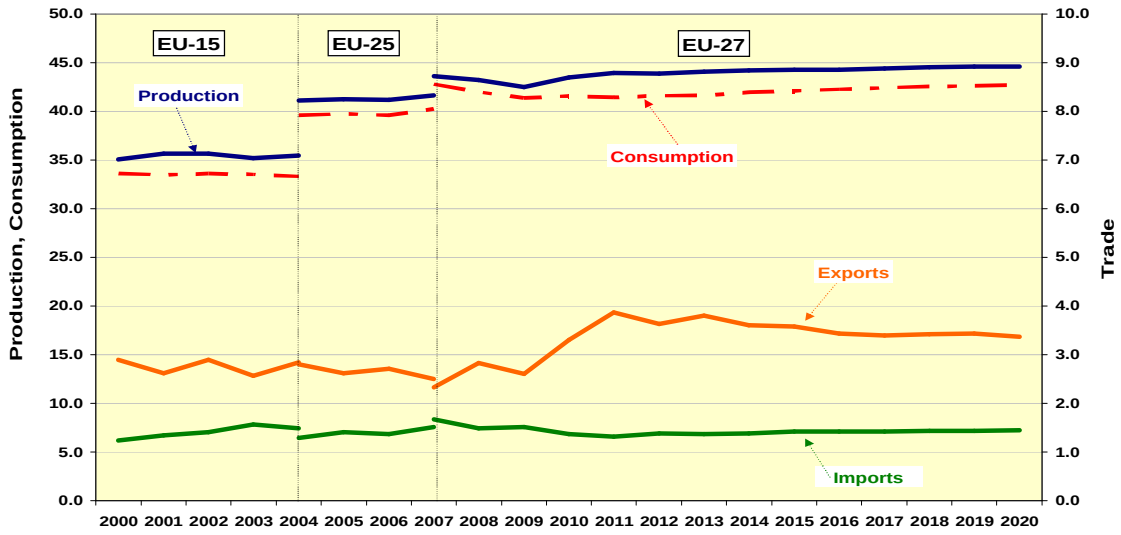
Domestic policy setting has limited effects on meat markets

The status quo policy assumptions for the outlook imply a continuation of the restructuring of sheep, goat and cattle herds stemming from the past decoupling of direct payments. Beef production would have an indirect impact from the phasing out and abolition of the milk quota system, through its impact on the dairy cow herd.

Aggregate meat production recovers but the net trade position deteriorates

Meat production is projected to recover over the near term from the decline suffered in the wake of the economic crisis. Aggregate meat production would reach 44.7 mio t in 2020, exceeding the 2010 level by 2.4% (Graph 3.1). The situation differs between ruminant and non-ruminant production, as beef/veal and sheep/goat meat production drops by 1.3% and 7.9% respectively, while pig and poultry meat production expands by 3.6%.

Graph 3.1 Aggregate meat market developments (mio t), 2000-2020

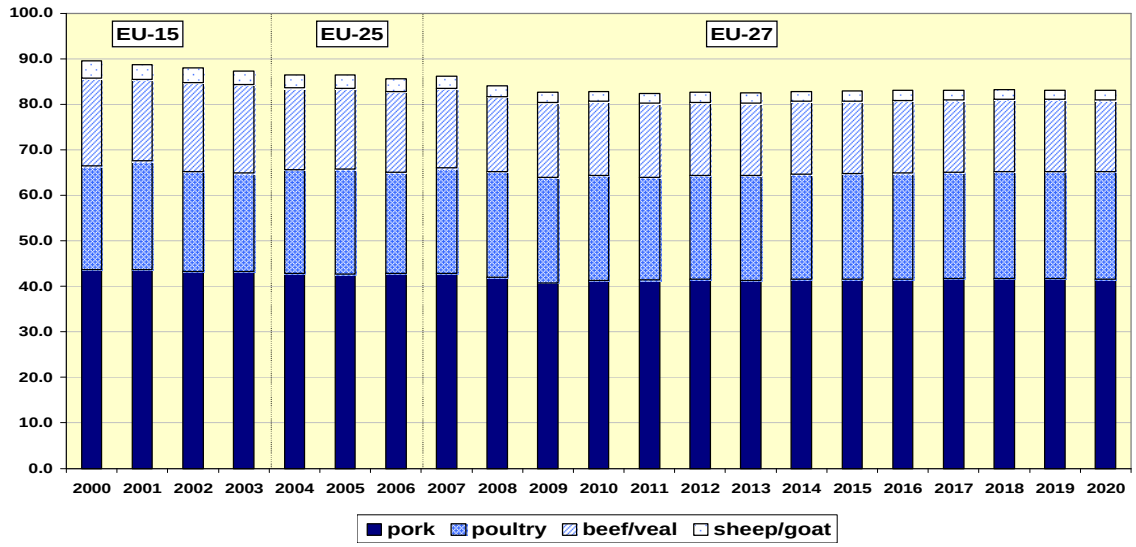


Following a short term improvement driven by the weaker EUR, the net trade position of the EU is projected to deteriorate slightly over the outlook due to a steady, albeit modest increase in meat imports (of beef, sheep and goat and poultry meats) and a parallel decline in meat exports (of pig and poultry meat) over the medium to long term. Aggregate meat imports would grow by 6.1% and exports would remain above the 2010 level by 1.9% in 2020.

Meat production is driven by increasing poultry and pig meat consumption (Graph 3.2). On a per capita basis, EU meat consumption would reach 83 kg in 2020, just 0.3% higher than in 2010. Poultry meat consumption would increase the most between 2010 and 2020, by more

than 4%, while pig meat growth would remain below 4%. Beef and veal and sheep and goat meat consumption would decrease by 0.8% and 3.6% respectively.

Graph 3.2 Total meat consumption developments (kg/capita), 2000-2020



Pig meat would remain the most popular meat in the EU at 41.6 kg/capita in 2020, compared to 23.6 kg for poultry, 15.8 kg for beef and veal and around 2 kg for sheep and goat meat.

Total consumption would grow faster in the EU-15 (by 3.2%) between 2010 and 2020, but, given the assumptions on increasing population in the EU-15 and declining population in the EU-12, consumption is projected to grow faster in the EU-12 by 1.3% when expressed on a per capita basis. Even so, the total per capita meat consumption of the EU-12 (75.1 kg) would remain below the EU-15 level (85 kg) in 2020.

Pig meat market developments

With feed prices increasing drastically in the summer of 2010 and weighing heavily on producers' margins, pig meat prices plunged in the second half of 2010 and remained at a low level at the beginning of 2011. This serious situation was aggravated in a number of Member States in the wake of the dioxin incident in Germany, and prompted the European Commission to introduce private storage aid over a period of three weeks in February 2011 to stabilise prices. The result has been some further concentration and structural changes in the sector.

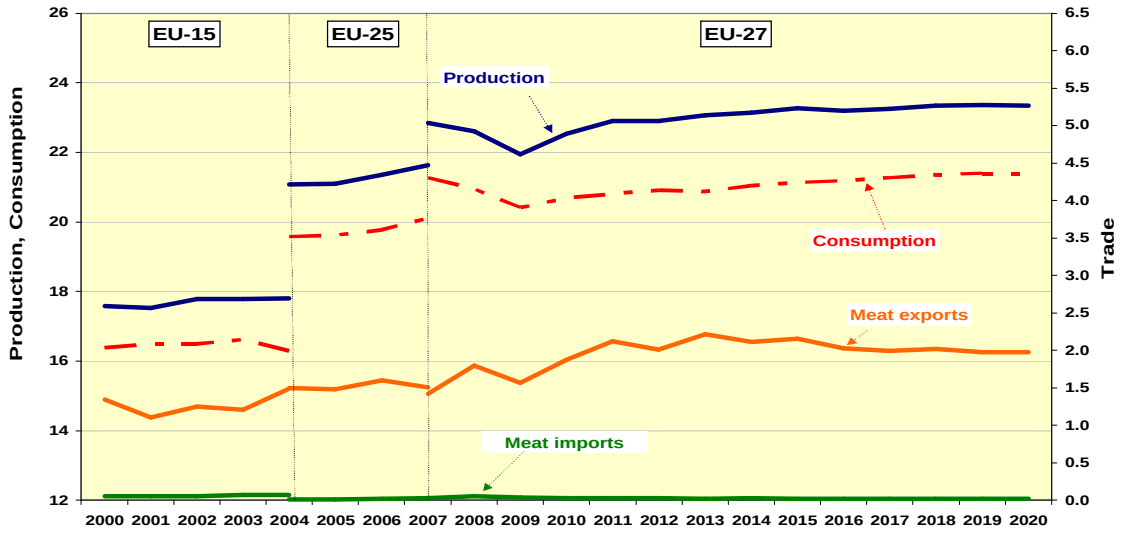
Pig meat prices recovered substantially from spring onwards, and stayed around EUR 1550/t throughout the summer and early autumn 2011. Although piglet prices remained rather low throughout most of the year, they have showed the signs of recovery during the most recent weeks. This improved price and profitability environment led to increased productivity and an expected 1.3% increase in EU pigmeat production in 2011.

EU exports have grown considerably (+20%) in the first half of 2011as a result of increased demand from Russia and the major traditional markets in the Far East.

During the 2010-20 outlook period, EU per capita consumption is expected to marginally increase by 0.9% to reach 41.62 kg/capita in 2020; higher growth is expected in the EU-12. The overall pigmeat consumption would increase by 3.4% (4.2% and 0.6% in the EU-15 and EU-12 respectively). These favourable demand prospects are expected to drive EU

production, which is projected to grow by 3.6% on aggregate from 2010 to 2020, reaching 23.4 mio t by the end of the outlook (Graph 3.3).

Graph 3.3 Pig meat market developments (mio t), 2000-2020



The firm world demand observed for pork in 2011 is expected to persist over the outlook: global pigmeat consumption is projected to increase by 8.9% during the next decade, thus implying sustained potential for EU exports. Indeed, pigmeat exports in 2020 would be about 5% above the 2010 level. However, after reaching a peak in 2013, they are expected to follow a downward trend for the rest of the projection period, due to the assumed strengthening of the EUR and resulting impact on export competitiveness, particularly to the Far East. Exports are expected to decline, notably because of increasing competition from other exporters such as Brazil and policies adopted in some importing countries (e.g., China, Russia) aimed at increasing self sufficiency.

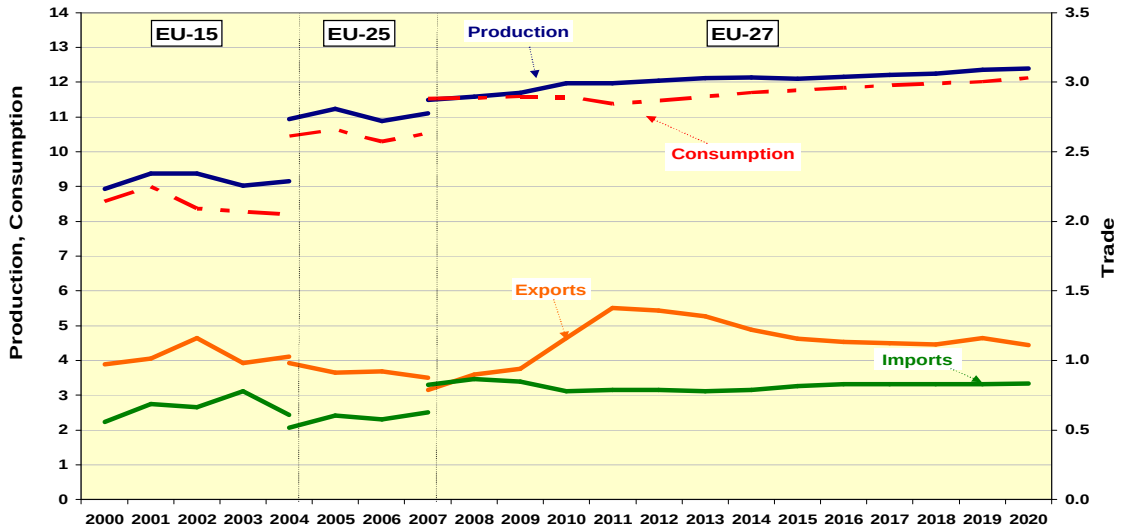
EU expected to remain net exporter poultry meat

In 2010 EU poultry meat production increased by 2.4% compared to 2009, as the general economic environment (limited economic growth, private consumption still close to stagnation and very high unemployment rate), played in favour of poultry consumption due to consumers' increasing preference towards this relatively cheap meat product, thereby continuing the shift from red meats towards poultry meat.

EU broiler prices have stabilised at a high level throughout 2011 (+10% above the 2006-2010 average). Due to its very integrated structure, the poultry sector was able to transmit high feed costs into higher product prices, alleviating the pressure on producer margins.

Despite the considerable decrease of exports to Russia (-51% over the first semester of 2011) as a result its decision to reduce overall poultry meat Tariff Rate Quotas, EU exports have strengthened considerably over 2010 and the first half of 2011, particularly due to higher shipments to Asia, Africa and the Middle East. First estimates of imports of poultry meat into the EU show a small increase in 2011 (+2.8%), in particular for high value products like frozen fillets and also preparations containing "quota meat" (with very low duty). Imports from Brazil, the main supplier, have been stagnating, whereas those from Thailand continue to increase.

Graph 3.4 Poultry meat market developments (mio t), 2000-2020



World demand for poultry meat is projected to increase over the medium term, with the EU expected to benefit from this trend. In addition, poultry would to continue to benefit from its "good value and healthy meat" image, leading to a steady increase in domestic demand. EU poultry meat consumption is expected to increase by 4.6% and reach 23.6 kg per capita by 2020, mainly driven by the increasing volumes consumed in the EU-15.

Over the outlook we can observe a gradual, albeit slight increase of 3.6% in production by 2020 (Graph 3.4). Poultry production is expected to remain flexible and responsive to demand fluctuations or higher input costs due to the short production time which provides this sector with a comparative advantage *vis-á-vis* other meats.

EU exports are expected to remain strong over the near term due to continued demand from Asia, Africa and Middle-East supported by a relatively weak euro. On the other hand, the long term prospects look less favourable due to the assumption of a stronger Euro. EU exports are projected to follow a steady decline and fall below the 2010 level by -4.4%. Overall imports of poultry meat into the EU would follow an opposite trend, increasing by 7.2% and exceeding 835 thousand t by 2020.

Beef and veal net imports would expand further

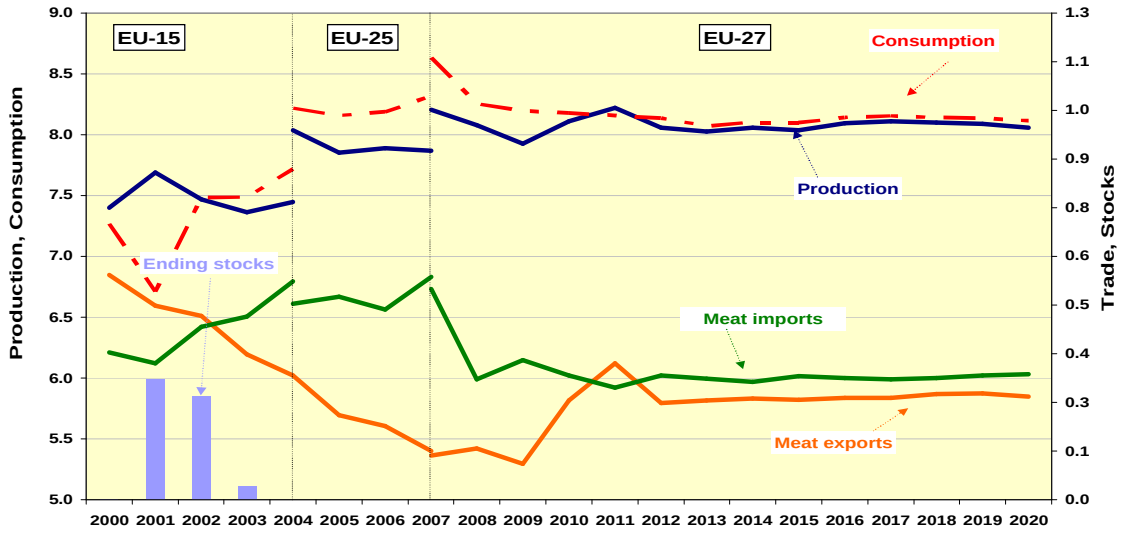
The EU beef market is strongly influenced by evolutions in the dairy sector, given that around half of beef comes from the dairy herd. In the first half of 2011 EU beef/veal production increased by 1.9% based on increased slaughterings, particularly of dairy cows (+5.4%). This underlines the constant decrease in the number of cows due to structural changes in the dairy sector (-3.6% compared to last year).

EU beef prices increased strongly in the last quarter of 2010 and remained well above the 2010 level throughout 2011, softening the effect of higher feed costs and reducing the pressure on producer margins. EU price developments seem to have reflected world market price developments over 2010 and 2011, driven by increasing global demand and tight supply.

In its trade with third countries, the EU strengthened its position as net exporter of beef meat and live animals in 2011. Following the sharp increase in 2010, EU exports achieved further gains in 2011, mainly due to huge increase to Turkey and also Russia. On the import side, EU imports decreased in particular from Mercosur, as the tight cattle supply situation in Argentina and increasing domestic demand in Brazil limited availability of beef from the

traditional EU suppliers. On the other hand, imports from the US and Australia have increased under the new *erga omnes* quota (0% duty for high quality beef from intensive fed, 'hormone free' beef). As a consequence, the EU is expected to become a net exporter of beef meat in 2011, the first time since 2002.

Graph 3.5 Beef meat market developments (mio t), 2000-2020



Demand for beef and veal meat is projected to shrink further over the medium term, decreasing by -0.8% on aggregate to below 8.1 mio t in 2020 (Graph 3.5). Consumption per capita is projected to stand below 15.8 kg in 2020, more than 3% lower than in 2010. Beef and veal meat production is expected to decline by 1.3% on aggregate from 2010 to 2020, to stand slightly above 7.4 mio t by the end of the outlook.

Contrary to the improvements in 2010 and 2011, it is expected that the EU trade position for beef would deteriorate over the medium term, partly driven by the deteriorating competitiveness from a strengthening euro. EU beef/veal meat exports and imports would grow by 3.8% and 1.1% respectively between 2010 and 2020. Thus, the EU would lose its position as net meat exporter, but nevertheless would maintain its position as net exporter of combined meat and live animals despite a gradual decline in live exports (by 40%).

Sheep and goat meat production declines further

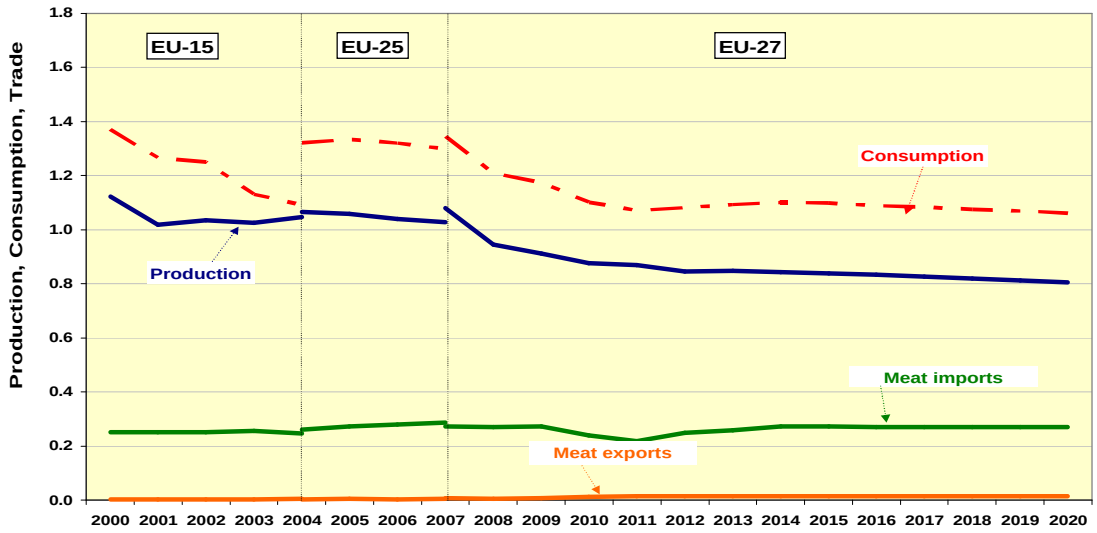
The EU sheep and goats population and production are constantly decreasing, although the decline appears to be slowing down.

World market prices are expected to stay relatively high, due to the overall limited supply. The EU price for heavy lamb has come down from the heights of the first months of 2011 (reflecting tight supply in the UK), but still remains 7% above the 2010 level (at EUR 455/100 kg). The light lamb price is now 3% above 2010 level in mid-September (EUR 650/100 kg), but seasonal peaks since last year have been much lower than normal, which is mainly caused by lower purchasing power, and thus reduced consumption in Spain.

Regarding trade with third countries, the EU sheep meat imports in July were 11% down on July 2010, driven by reduced quantities from New Zealand, whose 2010 total quota use was lower due to its lower production. Based on this year's trade and New Zealand's own estimate, the quota use will be even lower this year. Even if marginal in volume, exports were up 26% due to higher live lamb exports. Live exports (818 000 head) were almost four times higher

than in the same period in 2010, over 90% of which is destined for Turkey, mainly from Bulgaria.

Graph 3.6 Sheep and goat meat market developments (mio t), 2000-2020



Demand for sheep and goat meat is expected to contract further, with overall consumption projected to decrease by 3.6% by 2020 and per capita consumption to reach around 2 kg (Graph 3.6).

Total EU sheep and goat population is constantly decreasing and production is expected to shrink by 7.9% over the medium term.

Concerning trade, it is projected that sheep meat imports would recover in the long run, to exceed the 2010 level by 13.1% in 2020, provided that New Zealand recovers from the 2008-2009 droughts and poor lambing years and that the import quotas would be filled.

4 Milk and dairy products

The expectation of continued demand growth in developing countries remains the key driver for longer term market prospects, facilitated by economic growth, increasing population and preference for dairy products.

4.1 Recent market developments

In 2010 and the first nine months of 2011 dairy markets witnessed relatively favourable price developments. This followed a period characterised by strong market turbulence, with unprecedented high prices in 2007 and a sharp drop in 2008 and early 2009, leading to the milk crisis in the EU and worldwide. Price variations on the commodity markets were reflected in the farm gate price paid to milk producers, albeit with a certain delay and only partially, prompting the European Commission to reflect on the functioning of the supply chain through a High Level Expert Group on Milk and leading to the proposal on a 'milk package' in December 2010.

Commodity markets have continued recovering in 2011, driven by strong world demand. Milk prices have followed the increase in commodity prices with the weighted average EU milk price reaching 34.8 euro/100 kg in September 2011, 6.6% above the same month in 2010. After an estimated increase by 1.2% in 2010, EU cow milk deliveries to dairies are expected to further expand by 1.9% in 2011. Total EU milk production would reach 150.8 mio t in 2011, thanks to a continuous increase in milk yields both in the EU-15 and in the EU-12 which compensates for the contraction in the herd. The 2011 figure is based on the trend observed in the first two quarters of 2011, when milk deliveries registered successive increases except for May-June, when the drought in the North of the EU dampened the upsurge in milk production compared to the same months of 2010.

Despite this rather favourable global market situation over 2010 and the first 9 months of 2011, expectations for the short term very much depend on the extent of increased milk production both in the EU and in the main supplying countries (New Zealand, Australia, USA, etc.) and the sustainability of strong demand on the world market. Factors contributing to the strong price recovery of 2010-11 have been linked to adverse weather conditions in the Southern Hemisphere and strong import demand on the world market led by China and other countries of South–East Asia as well as by the Near and Middle East. A downward correction is projected for dairy prices in the near term, influenced by higher production from major exporting and certain importing countries, the negative demand effects of recent high prices and the uncertain economic conditions in the EU and other developed countries. Import demand expansion is expected to result in increasing prices for cheese, SMP and WMP. As a consequence producers' gross margins may improve, although this is conditional upon a stable relationship between milk price and commodity prices, and stable cereal prices.

4.2 Market prospects

Favourable world market perspectives over the longer term

Long term prospects for dairy markets appear favourable. The main driver is the continued expansion of world demand, resulting from population and economic growth, combined with increasing preference for dairy products (and thus growing per capita consumption). Sustained import demand, particularly from emerging countries, is expected to impact positively on dairy commodity prices fuelling EU export potential. Nevertheless, EU market

shares are projected to deteriorate for most dairy products (but stay roughly stable for milk powders) due to the assumed strengthening of the euro that limits EU competitiveness *vis-á-vis* other exporters.

Macro-economic environment creates uncertainties in the short term

The underlying macroeconomic assumptions suggest potential for improved EU exports in the near future as the EUR is assumed to weaken against the USD, while the longer term prospects are less favourable as the EUR is assumed to strengthen from 2014 onwards. The assumed exchange rate developments dampen long term commodity price prospects when expressed in EUR. The path of economic recovery in the EU and worldwide constitutes a considerable risk and increases the level of uncertainty regarding the outlook projections. For instance, a downward revision of the assumed development in GDP may lead to less favourable prospects for high value added dairy consumption, leading to lower EU consumption and reduced demand for EU exports.

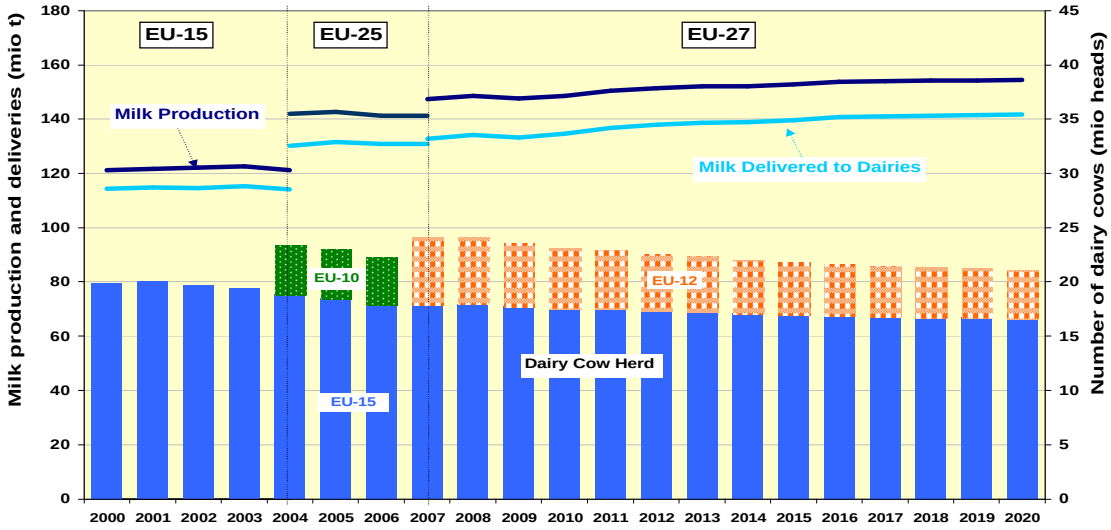
Policy setting increases potential for milk supply

The status-quo policy assumptions for the outlook imply an increased potential for milk production through the phasing out and abolition of the milk quota system by 2015. Available market intervention mechanisms following the CAP Health Check, notably intervention buying-in for SMP and butter, as well as the possible use of export refunds do not play a role in the baseline projections, as commodity prices remain above intervention levels throughout the outlook. Intervention stocks have been depleted for butter and the remaining SMP intervention stocks are assumed to be placed on the market over the near term, under the food programme for the most deprived persons.

Cow's milk production expands slowly until 2015, then recovers

Milk production is projected to continue increasing from 2011 onwards, at a moderate growth rate (Graph 4.1). Aggregate EU production would remain below the potential growth rate provided by the gradual elimination of the quota regime.

Graph 4.1 Cow's milk supply and dairy herd developments, 2000-2020



EU milk production is projected to reach 157.6 mio t in 2020, accounting for a cumulative increase from 2009 of 7%. This increase comes as a result of a slightly higher growth rate (at 9%) for milk delivered to dairies and a continuous decline of production for on-farm use (by -12%). Milk deliveries would reach almost 145 mio t in 2020, while production for on-farm consumption would decline just below 13 mio t. The latter is mainly driven by a gradual contraction of subsistence production in the EU-12, which is expected to decline by 11% over the projected period.

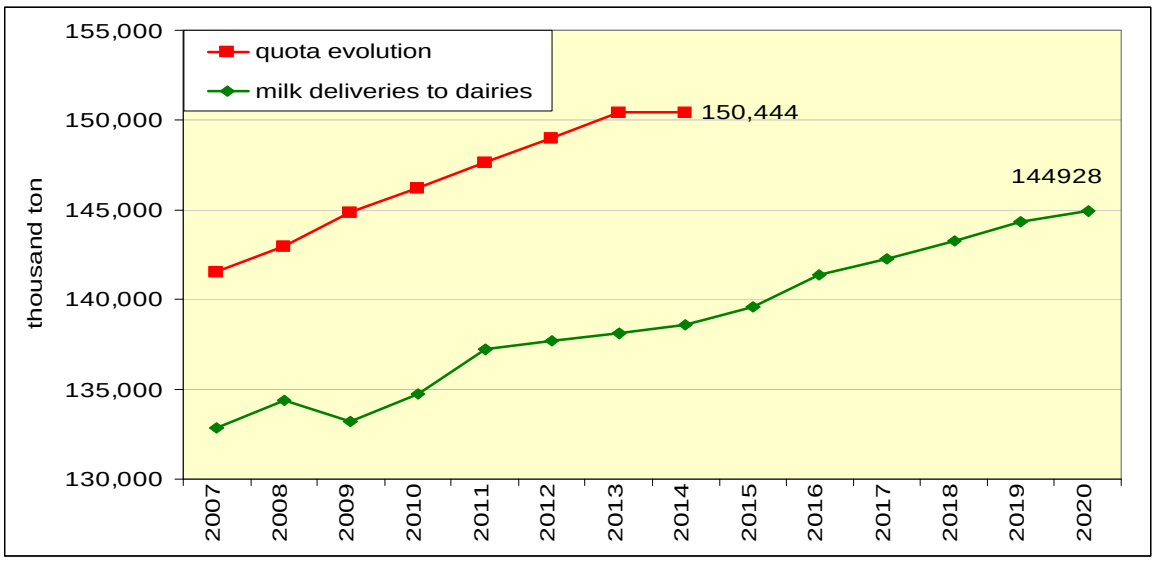
The increase in milk production stems from a continued increase in the average yield per dairy cow that would reach 7 400 kg by 2020 (a cumulative growth of 18%), while the EU dairy herd is projected to contract by 9% to the level of 21.4 mio animals in 2020. Developments would be more pronounced in the EU-12, where the number of dairy cows is projected to decline by 19% (compared to -6% in the EU-15) as a result of continuous restructuring. By contrast, the average yield per cow is projected to grow by 26% in the EU-12, compared to a 15% increase in the EU-15. Despite the higher growth rate, average EU-12 cow productivity at 6 000 kg will remain below the EU-15 level of 7 700 kg.

Milk deliveries and quota abolition

The utilisation of available milk quotas at the aggregate EU level has declined considerably over the recent quota years, from a 1.6% underutilisation in 2007/2008 to an expected 7% underutilisation in 2010/2011 due to the aforementioned developments in milk deliveries and the increase in available delivery quotas. These percentages correspond to a 2.2 mio t underutilisation in 2007/2008 and 11 mio t in 2010/2011. At Member State level there are huge differences, ranging from a marginal quota overshoot in Cyprus, Denmark and the Netherlands to almost 42% underutilisation in Romania.

Current projections imply that EU milk deliveries would not be able to keep up with the annual increase in quotas over the phasing out period (Graph 4.2), leading to a steady decline in quota utilisation at aggregate EU level. By 2014/2015, the last quota year before abolition, EU milk deliveries are estimated to be at 13.9 mio t (or 9%) below the quota level. The underutilisation would almost reach 7% in EU-15 and 22% in EU-12.

Graph 4.2 Milk deliveries and quota utilization for cow's milk



A report on the dairy market situation published by the Commission in December 2010[4] underlines that the overwhelming majority of Member States are on track for a soft landing , with only 3 Member States (DK, NL, CY) over quota in 2009/2010 so that milk quota prices now have a very low value, already zero in some Member States.

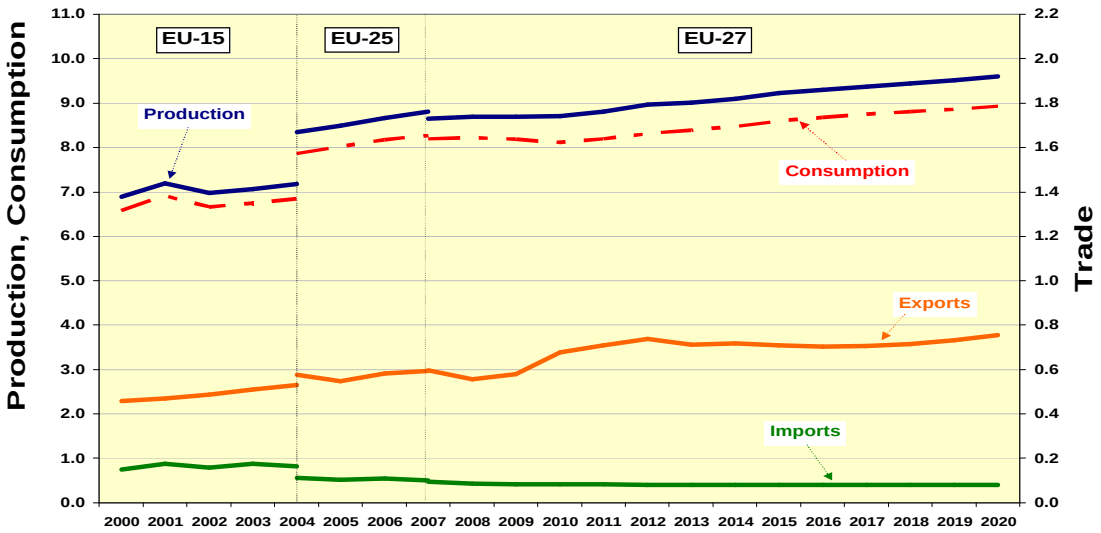
As can be seen in Graph 4.2, quota abolition is projected to have a limited impact on milk deliveries at the aggregate EU level, with deliveries at the end of the projection period remaining well below the (expired) quota level.

Demand for value added commodities fuels cheese production

During the outlook period, EU consumption of higher value added dairy commodities (fresh dairy products and cheese) is expected to return to the growth trend observed prior to 2007, although at a much lower rate, especially in the short run as consumer prices would remain at relatively high. EU cheese consumption per capita is projected to reach 17.3 kg in 2020, exceeding the 2009 level by almost 6%. The positive domestic consumption projection derives from the existing room for per capita consumption growth in the EU-12.

Cheese output is seen to grow by almost 10% on aggregate from 2009 to 2020, reaching 9.5 mio t by the end of the outlook (Graph 4.3). As demand prospects are positive for both the domestic and world markets, in spite of the strengthening EUR, substantial import demand from the world market would allow for a progressive increase of EU exports reaching 727 thousand t in 2020. The positive outlook for exports is based on sustained demand from the main cheese importers (Russia, Japan, the US, etc.). The EU will gradually lose world market share, but still account for around 27% of global exports in 2020.

Graph 4.3 Cheese market developments, 2000-2020



Production of fresh dairy products is projected to increase by 6.2% driven by an expansion of both EU-15 and EU-12 output, at a modest but sustainable rate from 2014 onwards.

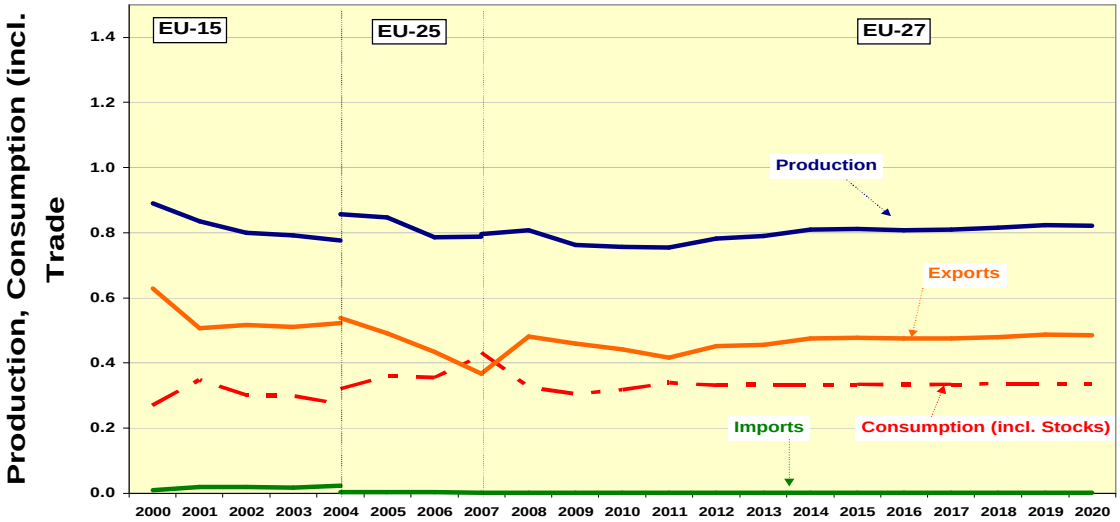
WMP production supported by world demand

Production fluctuations for whole milk powder (WMP) in past years underline the important role that export potential plays for this commodity. WMP production is expected to stay relatively stable over the near term, but will grow at a sustained albeit limited rate over the

4 The report is available on http://ec.europa.eu/agriculture/milk/quota-report/com-2010-727_en.pdf

long term (Graph 4.4). This recovery will occur thanks to relatively favourable world market conditions, leading to production of 788 000 t in 2020 (+3.4% with respect to 2009). EU consumption would stabilise at around 348 000 t over most of the outlook. The long term prospects for EU WMP exports are supported by an increase in world demand. EU exports are projected to reach 441 thousand t in 2020, driven by increasing world demand, led by China. However, EU market share of global exports would decline gradually to 20% by 2020 (from 25% in 2009).

Graph 4.4 WMP market developments, 2000-2020

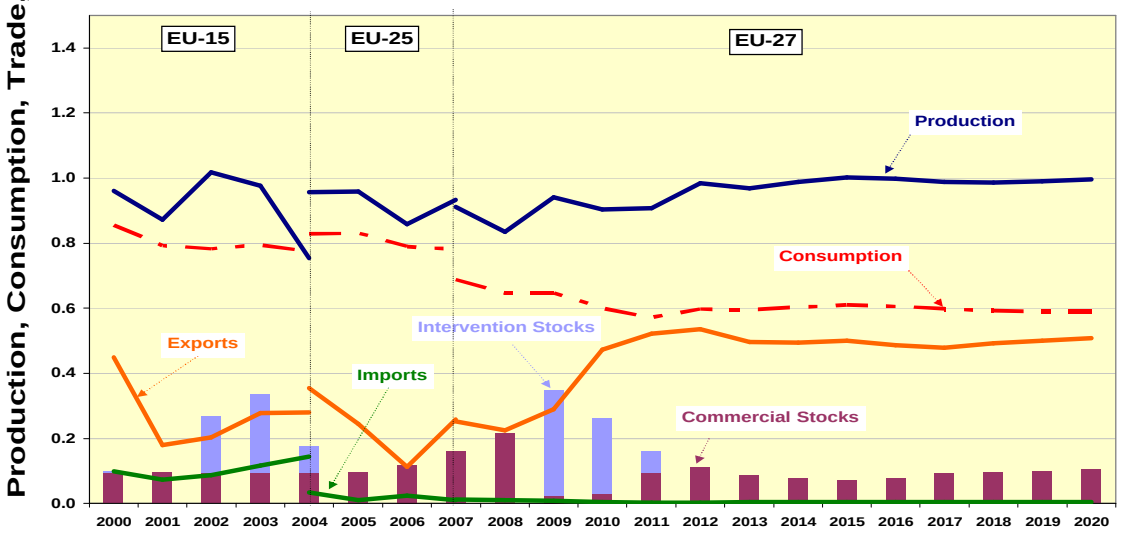


SMP market balanced through exports

The SMP market conditions in 2010 and 2011 have been favourable due to strong import demand on the world market (already +27% in the first 9 months of 2011), while domestic use is expected to remain stable. China is gradually becoming an important player in world SMP imports; now at a level comparable to Algeria, the traditional SMP importer. SMP intervention stocks built up in 2009 are expected to be completely sold out by the end of 2012 through a combination of sales by open tender and assumed release under the most deprived person's scheme.

The strong global import demand contributes to market balance, driving a favourable outlook for SMP exports. EU production is projected to increase by 10% throughout the outlook to reach around 1 mio t in 2020 (Graph 4.5). Domestic consumption prospects are fairly weak for SMP. Feed use would continue to contract, driving a steady decline in EU SMP use to 220 000 t by 2020, which is 9% below the level of 2009. Exports would reach 443 000 t by the end of the outlook (almost double with respect to 2009, but below the expected 2011 peak). These very positive export prospects are based on sustained demand from China and Algeria. The EU could see its world market share improve by 4 percentage points over the period to reach 23% of global exports in 2020, supported by a stronger orientation by the competing exporters towards cheese, butter and WMP.

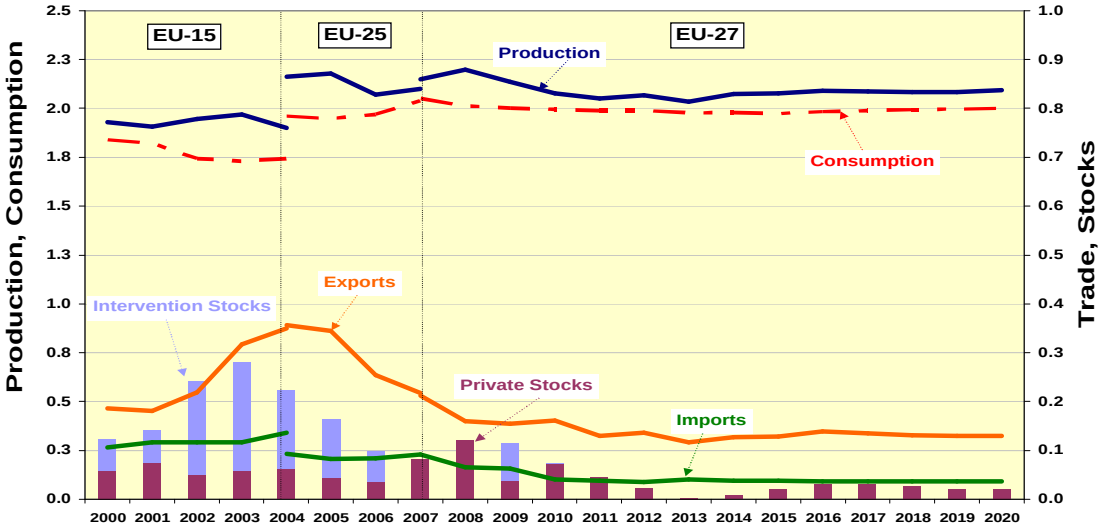
Graph 4.5 SMP market developments, 2000-2020



Butter market balance remains stable conditioned to firm demand

Continued contraction in butter supply and firm demand have kept prices high throughout 2010 and 2011 and enabled the release of almost all the intervention stocks without creating supply pressure on the market. Imports are declining due to unprecedented high prices on the world market, driven by continued firm demand and limited export availabilities, but EU exports still remain uncompetitive (apart from Russia) given the existing price gap between EU and world quotations. Total butter production is expected to increase slightly in the short run, and remain relatively stable, reaching 2.1 mio t in 2020 (-1.3% with respect to 2009).

Graph 4.6 Butter market developments, 2000-2020



The projections (Graph 4.6) point to continued market stability for butter, thanks to positive market conditions over the projection period, with prices at relatively high levels and firm EU demand (around 2 mio t). The long term trend of declining consumption per capita would continue although at a lower pace, reaching 3.9 kg/per capita by the end of the outlook (2% below the level of 2009). The relatively stable consumption is supported by a higher increase

in the price of vegetable oils *vis-à-vis* butter. The outlook for butter exports is less favourable given the assumed strengthening of the EUR and increasing supply from other exporting countries. Exports would stabilise around the level of 129 000 t by the end of the outlook.

While the outlook displays continued market stability for butter, it remains conditional on an assumed status quo regarding dietary preferences. The effect of a change towards low(er)-fat dairy commodities would have a direct effect on butter consumption and an indirect effect on butter production, as less milk fat would be used in the production of other dairy commodities (notably cheese and fresh products), increasing residual fat for butter production.

5 Agricultural Income

5.1 Historical developments

Between 2000 and 2011[5], the agricultural income per annual working unit[6] in the EU-27 increased both in nominal and in real terms. This evolution corresponds to a moderate expansion of nominal income at sector level (but a decline in real income), accompanied by a progressive reduction in the total working force employed in agriculture.

The growth of agricultural income per annual working unit in the EU-27 has been quite significant in nominal terms (4.3% per year on average), but more modest in real terms (2.0% per year). Furthermore, the income pattern of the last decade has been relatively volatile. After increasing by roughly 16% between 2000 and 2004, real agricultural income per worker fell by more than 9% in 2005. During 2006 and 2007, it rose again by 14%, largely due to soaring commodity prices, but it declined over the following two years (-10.3% in 2009 alone) with the burst of the price bubble and the beginning of the economic recession. Finally, 2010 and 2011 were characterised by a noteworthy income recovery (+19.8% over the two years), driven by the upturn in agricultural prices, which brought EU-27 agricultural income to a level that is 25% higher than in the year 2000, even above the record level of 2007.

The historical development of agricultural income per annual working unit has been quite different in the EU-15 and in the EU-12. Real income in the EU-15 basically stagnated between 2000 and 2006. Due to the commodity price boom, income increased in 2007 by almost 8% compared to the previous year, but this increase was offset by two successive declines, including the slump in 2009, which caused income to plummet to the lowest level over the whole of the last decade.

Today, after the rebound in agricultural prices of 2010 and 2011, EU-15 agricultural income settled just slightly higher than in the year 2000 (+1.1%). By contrast, in the EU-12 income has been significantly growing since 2000. Although the 2009 decline in income also strongly affected the EU-12, the recovery in 2010 and the further boom of 2011 fully restored the historical trend. Thus, EU-12 real income in Euro per worker in 2011 was 86% higher than the pre-accession year 2003. This is mainly due to the higher market prices prevailing in the single market and the increase in public support for the farm sector. Despite this, the gap in the absolute level of agricultural income per worker between old and new Member States in 2011 remains very large, to the advantage of the EU-15.

The 6.7% increase in EU-27 real agricultural income per working unit observed in 2011 compared to 2010 resulted from an increase in real income at sector level (+3.9%) combined with a reduction in agricultural labour input (-2.7%). The increase in EU-27 income at aggregated level was determined by a significant growth of the value of agricultural output in real terms (+7.9%), in spite of the simultaneous sharp increase in expenditure for intermediate consumption (+9.7%) and the marginal rise of fixed capital consumption (+0.7%). At sector level, the growth in real production value in 2011 was broadly the same for vegetable crops (+8.0%) and for animal products (+7.8%). On the inputs side, total expenditure in real terms rose for almost all cost items: particularly sharp increases were registered for fertilisers (+24.5), feedingstuffs (+15.9%) and energy (+11.3%).

5 The source for agricultural income of 2011 are Eurostat early estimates of Economic Accounts for Agriculture published on 20 December 2011.

6 An annual working unit (AWU) is equivalent to the work performed by a full-time worker during one year.

The increase in the value of agricultural production in 2011 was driven mainly by rising commodity prices, whereas the effect of the growth in production volumes was more modest. In the *crop sector,* producer prices grew on average by 5.4% in real terms, while production volumes grew by 2.5%. The highest increase in producer price was registered for cereals (+18.9%), oilseeds (+18.4%) and forage plants (+10.2%). For other crop products (e.g., potatoes, fruits, wine), the increase was much smaller, or the price variation was even negative (e.g., vegetables and horticultural products -6.6%, olive oil -0.9%). The average increase in real producer price for animal products (+6.7%) was slightly higher than for crops, but production volumes rose only marginally (+1.1%). Variations in volumes were quite modest for all the main animal products, whereas producer prices significantly increased for some products, e.g. for milk (+9.1%), poultry (+8.7%), cattle (+8.6%).

5.2 Income prospects

The medium-term prospects for the income of the agricultural sector have been compiled on the basis of the projections for the main agricultural markets presented in the earlier chapters. The economic accounts for agriculture constitute the statistical basis of the outlook for agricultural income[7].

The results of the income outlook for the EU agricultural sector have to be interpreted not only in the context of the economic and policy setting underlying the market projections, but also in light of additional caveats specific to the income estimation. Notably, certain key assumptions had to be made regarding the prospects for agricultural sectors which are not covered by the modelling tools used for the baseline projections – these include the rate of fixed capital consumption, the level of subsidies (established on the basis described above) and the pace of future structural change. These elements impact upon the prospects for agricultural income, in addition to the general uncertainties surrounding the current medium-term projections described in the subsequent chapter.

While the medium-term changes in the price and volume components of the arable crops and major livestock sectors have been established in line with the market projections, in the remaining agricultural sectors – such as fruit, vegetables, wine and olive oil – it was assumed that income would follow a development related to its historical trend, while also taking into account the main drivers identified for the projections about the main commodities.

The subsidy component of agricultural income has been established on the basis of:

- the estimated evolution of direct payments for 2010-2013 and the assumption that they would remain unchanged in the post-2013 period (single payment scheme and other direct payments following the Health Check decisions);

- the rural development component from the European Agriculture Fund for Rural Development as adopted for the 2007-2013 period for the EU-27. Only the current transfers to agricultural producers as other subsidies on production have been accounted for in the income calculation (thus excluding all the capital grants and investment aids as well as support to operators outside agriculture). Member States have been assumed to fully use the rural development funds available to them (including the co-financing component of rural development funds);

7 Agricultural income is defined as the factor income of the agricultural sector expressed in real terms and per annual work unit.

- the main provisions of the Act of Accession regarding direct payments for the EU-12 (progressive introduction, SAPS and the complementary national direct payments - CNDP or "top-ups"). The possibility for financing the CNDP from the national budget or from co-financing with rural development EU funds has also been taken into account where relevant. In this context Member States respect the upper limit on the financial envelopes.

On the basis of these assumptions, income projections display a marginal growth over the outlook period (Table 5.1). Compared to a five year average of the period 2007-2011, the EU-27 agricultural income per annual working unit in real terms would be 8.8% higher in 2020 compared to the base period. This positive trend is the result of an expected sharp deterioration of the factor income in real terms at sector level (-18.6%), which is more than compensated by a reduction in the workforce employed in agriculture (-25.2%). In turn, the reduction of the aggregated real factor income over the next decade stems from the expected stagnation of the corresponding nominal income.

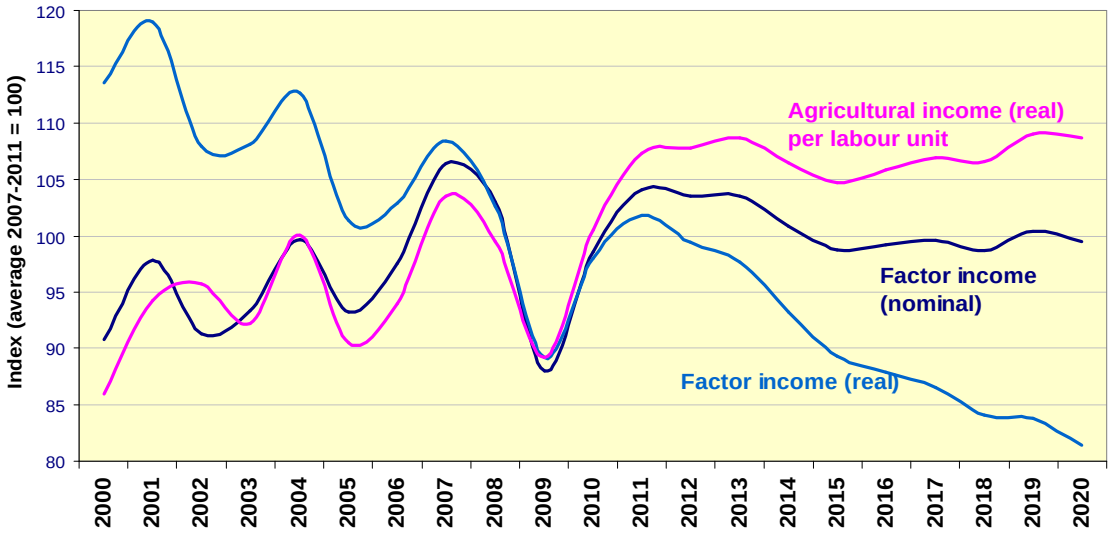
Table 5.1 Outlook for agricultural income in the European Union, 2012-2020 (average 2007-2011 = 100)

	average 2007-2011	2011 (*)	2012	2013	2014	2015	2016	2017	2018	2019	2020
Factor income in nominal terms											
EU-27	100.0	104.1	103.5	103.6	100.9	98.7	99.3	99.6	98.7	100.4	99.5
EU-15	100.0	101.0	102.1	101.0	98.2	95.7	95.8	96.1	95.0	96.9	95.7
EU-12	100.0	119.1	110.5	116.1	114.3	113.8	116.7	117.2	117.0	117.9	118.0
Factor income in real terms											
EU-27	100.0	101.8	99.4	97.7	93.2	89.3	87.9	86.5	84.0	83.8	81.4
EU-15	100.0	99.2	98.5	95.8	91.3	87.1	85.4	84.1	81.5	81.5	79.0
EU-12	100.0	115.5	104.3	106.3	101.9	99.0	99.0	97.1	94.6	93.1	91.1
Labour input											
EU-27	100.0	94.8	92.2	89.8	87.5	85.2	83.0	80.9	78.8	76.8	74.8
EU-15	100.0	96.4	94.6	92.9	91.3	89.7	88.1	86.5	85.0	83.5	82.0
EU-12	100.0	93.3	89.9	86.8	83.8	80.9	78.2	75.5	72.9	70.4	68.0
Agricultural income in real terms per labour unit											
EU-27	100.0	107.3	107.8	108.7	106.5	104.7	105.9	106.9	106.6	109.1	108.7
EU-15	100.0	102.9	104.2	103.2	100.0	97.2	97.0	97.2	96.0	97.7	96.5
EU-12	100.0	123.3	115.5	121.9	121.0	121.7	126.1	128.0	129.3	131.7	133.4

(*) Eurostat early estimates of Economic Accounts for Agriculture

Against the background of an overall positive trend in real agricultural income per worker, marked differences appear between the EU-15 and EU-12 aggregates. In the EU-15, agricultural income would fall slightly over the projection period: by 2020, it is expected to be 3.5% lower than in the base period. On the other hand, in the EU-12, agricultural income continues to display a positive trend, almost 35% higher than the reference period by 2020. This divergence in income partly stems from a different growth pattern in real income at the aggregated level, but is also a consequence of a sharper decline in the agricultural workforce in the EU-12 (-32%) compared to the EU-15 (-18%), due to stronger structural adjustment taking place in the new Member States.

Graph 5.1 Development of agricultural income in the European Union, 2000-2020 (average 2007-2011 = 100)



Projections indicate that the value of total agricultural production after 2011 is flat , with the increase for animal products and specialised crops being on average offset by the decline for field crops. Input costs are also expected to remain steady over the next decade. In the EU-12, total nominal income would still show a positive trend, partly due to increasing public support granted to agricultural producers. However, the higher inflation rate in new Member States compared to the EU-15 partly offsets differences in the development of total real income between EU-15 and EU-12.

6 Conclusion: What implications can we derive from the projections?

Apart from the caveats inherent in the economic modelling of agricultural markets, the projections presented in Part I of the publication are conditional upon the underlying assumptions concerning the drivers of EU agricultural markets, namely world market developments, relevant EU policies and a number of external factors. These external factors include the macroeconomic environment, non-agriculture and non-EU policies as well as weather and animal health risks. These 'traditional' drivers have become more complex over time, with the USD no longer the only exchange rate to consider when assessing future trade prospects, weather patterns becoming increasingly volatile and extreme. Furthermore policy assumptions need to reflect changing global powers (from G-2 to G-20) and market linkages (e.g. renewable energy directive).

The strengthening of the link between agricultural and energy markets as well as other recent developments such as the co-movement of different commodity markets and the financialisation of agricultural commodity markets implies that developments in agriculture are increasingly driven by external factors that are not inherent in agricultural markets or policies. This is shown in analyses of the pre-crisis price boom by the OECD as well as more recent work by the World Bank that demonstrates that 'traditional' drivers are less influential in determining market developments. Rather, the most important drivers of agricultural markets are external, particularly the development of the crude oil price and exchange rate developments in the main exporting and importing countries.

This is reflected in the results presented in Part I of the publication, with the major determinant of EU agricultural market developments being the outlook for crude oil price with its impact on biofuel feedstock demand (itself subject to assumptions about EU biofuel policy) and input costs.In the assumed setting the growing demand for biofuel feedstock is the single driver of EU crop market developments, while the impact of the crude oil price on input costs results in limited prospects for growth in producers' margins and thereby farm income, especially for the EU livestock sector through a direct impact on energy costs and indirect impact on feed prices.

The implications of exchange rate assumptions are apparent in the limited EU export potential for most (mainly bulk) commodities, pointing to a deterioration in the EU terms of trade.

On the other hand, there is a shared view by major market projection institutions that the long term prospects for global demand growth remain favourable, driven by expectations concerning sustained economic and population growth, as well as a continued shift in dietary patterns in developing countries, as illustrated by the FAO estimates on food demand in 2050. This should support commodity prices which are expected to remain above historical levels, confirming an end to the long-term decline in agricultural commodity prices, already implied in recent years.

However, markets have been extremely turbulent over recent years, and given the drivers of this high volatility, there is an increased likelihood of persisting and perhaps more frequent volatility in the future. While the results presented here do not reflect such changes, given the unpredictable nature of such events, Part II outlines the results of uncertainty analyses aimed at providing an assessment of the implications of alternative assumptions regarding the different drivers. As the changing weather patterns appear to have become a structural driver of market volatility, an analysis has been carried out on the implications of yield uncertainties, presented in Part II chapter 3. Results indicate that crop yield volatility has strong

implications for the net trade position of the EU crop sector given the relatively inelastic behaviour of food and feed demand. Nevertheless, the livestock sector is affected through changes in feed prices as well as the general availability of feed (with possible constraints on import availability and substitution).

Political developments in 2011 have displayed the sensitive market balance of crude oil, with the outlook for prices conditional upon the unfolding of events in the Middle East and North Africa. Developments in alternative energy sources (e.g. shale gas, solar, etc.) as well as environmental concerns could have additional, structural implications for the future demand for biofuel feedstock.

In the context of high uncertainties regarding the economic outlook, and its impact on global demand prospects through unemployment and income, trade prospects linked to the availability of credit, and the implications of constraints on bank lending for production decisions, etc. the assumptions and thereby the prospects are subject to increased (and at present considered to be short term) and mainly downward risks. The implications of alternative assumptions for key EU macroeconomic conditions, crude oil price and USD exchange rate are assessed in Part II, chapter 2 and chapter 5, which look at the impact of an alternative outlook for Chinese GDP growth. The results show that a slowdown in economic growth has little impact on the overall level of consumption while production, especially of biofuels, is more affected. Trade flows are highly sensitive to the macroeconomic assumptions in spite of rigidities represented by TRQs. At sector level it is the dairy sector that shows a greater sensitivity to macroeconomic uncertainty.

Experience of recent years has shown us that policies may have a significant impact on market developments, both structural from long term policies (e.g. US and EU biofuel policies) and ad-hoc as a response to short term market or economic developments (e.g. trade policies). To this end, the relatively positive outlook for EU meat and dairy exports vis-á-vis earlier projections has to be considered in the context of uncertainties regarding future trade policies, particularly in the framework of a turbulent economic environment that could warrant ad-hoc trade policy responses as well as the possible implications of the potential conclusion of trade negotiations. [8]

The increase in energy prices has instigated a more broad increase in input prices, with a comparable rise in fertilizer prices pushing up costs for crop producers and thereby leading to higher feed costs for the livestock sector. Given that the outlook for energy prices suggests that input costs will remain high and continue to increase, the generally favourable commodity price outlook as a result of increasing long term food demand (as outlined above) is a precondition for EU production to remain economically viable. As uncertainties surrounding input cost developments point mainly towards upward price risks, Part II chapter 6 looks at the implications of higher operating costs for EU producers. The results indicate that higher commodity prices linked to supply contraction due to higher production costs do not prevent income from falling in the crop sector.

The strong reduction in producer margins over recent years implies that producers have not been available to pass on higher costs into higher prices, as exemplified by the milk crisis in 2009, raising concerns about the functioning of the food supply chain and eventually necessitating policy reaction in the form of the High Level Advisory Group on Milk and the High Level Forum for a Better Functioning Food Supply Chain.

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[8] Analysis on the impact of a possible free trade agreement between the EU and Mercosur has been published recently on the website of DG AGRI, under Trade policy analysis: Agricultural trade. http://ec.europa.eu/agriculture/analysis/tradepol/trade/index_en.htm

Finally, the outlook for agricultural income is subject not only to the uncertainties on producer margins that are affected by the combination of drivers discussed above, but all other factors that contribute to farm revenues, costs and structural developments. One of the major concerns derives from the uncertain macroeconomic outlook and the implications of reduced availability of bank loans and national funding for farm-investments, infrastructure developments, thereby limiting further efficiency gains and diversification. Structurally higher unemployment and reduced GDP growth potential imply that alternative employment opportunities for the rural population will be rather constrained. Also considering the stronger resilience of the agricultural sector to economic shocks, given the generally inelastic demand and still low share of household expenditure on food on average in the EU, the rate of decline in agricultural labour could fall below that observed over the last decade. The possible impact of a deteriorating economic environment is more complex in the EU-12, where subsistence farming would have reduced alternatives, implying a slow down in the rate of labour reduction, while the potential constraints on national subsidies (in the form of remaining top-ups and co-financing) suggest the opposite effect.

While the objective of this publication is not to assess existing or alternative EU policies, a good understanding of the drivers of agricultural markets and their complex nature as well as the high level of uncertainties surrounding these drivers have implications for future policy orientation. As such, while the long term outlook appears to be supported by increasing consumption, providing incentives for increased competitiveness of EU agriculture in the context of declining crop yield growth, it must be acknowledged that most of EU demand growth for arable crops is driven by the existing biofuel policies that are subject to uncertainties linked to environmental concerns and competing sources of renewable energy. Global demand for meat products could also be subject to changing consumer preferences as a result of debates over the ecological footprint of livestock breeding.

The outlook for limited producer margin growth offers incentives for further efficiency gains, and given the likelihood of more frequent and extreme price volatility leading to sharp swings in annual income, it is important that prices are transmitted without long delay and fairly along the supply chain. The uncertainties around the outlook imply that producers themselves need to become increasingly aware of the risks they are faced with and be able to find appropriate ways to face up to these risks.

Statistical Annex

Total cereals balance sheet in the European Union, 2009-2020 (million tons)

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Usable production	294.1	277.9	277.3	282.4	282.4	285.7	287.6	292.8	294.8	299.0	300.8	305.1
of which EU15	211.8	199.2	195.1	201.3	200.7	202.3	203.1	206.2	207.0	209.3	210.0	212.3
of which EU12	82.3	78.7	82.2	81.1	81.7	83.3	84.5	86.6	87.8	89.7	90.8	92.8
Consumption	280.5	276.7	277.7	273.5	275.4	276.0	280.0	283.0	286.0	288.7	290.7	293.4
of which EU15	213.4	211.7	212.1	207.9	209.2	210.0	213.5	216.1	219.0	221.3	223.2	225.5
of which EU12	67.1	65.1	65.6	65.6	66.1	66.1	66.5	66.9	67.0	67.4	67.5	67.9
of which food and industrial	64.8	65.1	65.5	65.5	65.5	65.7	65.7	65.9	65.9	66.1	66.2	66.4
of which feed	172.6	167.5	166.7	161.5	160.4	158.6	160.8	161.2	161.8	161.9	162.1	162.5
of which bioenergy	7.6	9.3	10.5	11.9	15.2	17.7	19.4	22.0	24.0	26.3	28.3	30.3
Imports	8.0	13.3	16.4	12.2	12.4	11.1	12.6	11.3	12.2	11.9	12.5	12.0
Exports	27.4	31.8	20.8	22.6	19.9	20.5	20.1	20.5	20.3	21.1	22.0	22.8
Beginning stocks	60.3	54.5	37.1	32.3	30.7	30.3	30.6	30.6	31.2	31.9	33.2	33.8
Ending stocks	54.5	37.1	32.3	30.7	30.3	30.6	30.6	31.2	31.9	33.2	33.8	34.8
of which intervention	6.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

The years indicated represent marketing year N/N+1 (i.e. 2009 0 2009/2010)

Total wheat balance sheet in the European Union, 2009-2020 (million tons)

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Usable production	138.2	136.4	135.1	138.1	137.8	139.3	140.4	143.4	144.1	146.5	147.2	149.7
of which EU15	105.4	105.1	100.8	105.3	104.9	105.8	106.5	108.6	108.9	110.6	110.9	112.5
of which EU12	32.7	31.4	34.2	32.8	32.9	33.4	33.9	34.8	35.2	36.0	36.3	37.1
Consumption	129.6	124.2	127.9	127.5	129.3	129.7	131.7	132.8	134.3	135.3	136.3	137.2
of which EU15	105.1	101.5	104.1	103.6	105.2	105.5	107.4	108.2	109.7	110.4	111.4	112.0
of which EU12	24.4	22.7	23.7	23.9	24.1	24.2	24.3	24.5	24.6	24.8	24.9	25.2
of which food and industrial	55.4	55.6	56.0	55.9	56.0	56.1	56.1	56.3	56.4	56.6	56.6	56.9
of which feed	56.8	51.1	53.4	52.8	53.4	52.8	53.8	54.0	54.5	54.4	54.8	54.7
of which bioenergy	3.7	4.3	4.8	5.6	6.8	7.8	8.5	9.5	10.2	11.1	11.8	12.6
Imports	5.3	4.5	8.0	6.3	7.0	6.4	7.1	5.8	5.9	5.7	5.8	5.5
Exports	21.4	22.1	15.3	17.2	15.3	15.7	15.3	15.7	15.3	16.2	16.8	17.8
Beginning stocks	23.7	16.1	10.7	10.6	10.4	10.5	10.7	11.2	11.8	12.3	12.9	12.8
Ending stocks	16.1	10.7	10.6	10.4	10.5	10.7	11.2	11.8	12.3	12.9	12.8	13.0
of which intervention	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

The years indicated represent marketing year N/N+1 (i.e. 2009 0 2009/2010)

Coarse grains balance sheet in the European Union, 2009-2020 (million tons)

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Usable production	155.9	141.4	142.3	144.3	144.6	146.4	147.2	149.5	150.7	152.5	153.6	155.4
of which EU15	106.3	94.1	94.3	96.0	95.8	96.5	96.6	97.7	98.1	98.8	99.1	99.8
of which EU12	49.6	47.3	48.0	48.3	48.8	49.9	50.6	51.8	52.6	53.7	54.5	55.6
Consumption	150.9	152.5	149.9	146.0	146.0	146.3	148.3	150.3	151.7	153.4	154.4	156.2
of which EU15	108.3	110.2	108.0	104.4	104.0	104.4	106.2	107.9	109.3	110.8	111.8	113.5
of which EU12	42.6	42.3	41.9	41.7	42.0	41.9	42.2	42.4	42.4	42.5	42.6	42.7
of which food and industrial	9.5	9.5	9.6	9.6	9.5	9.6	9.5	9.5	9.5	9.5	9.5	9.5
of which feed	115.8	116.4	113.4	108.7	107.0	105.9	106.9	107.2	107.3	107.5	107.3	107.8
of which bioenergy	3.8	5.0	5.7	6.3	8.3	9.9	10.9	12.5	13.8	15.3	16.5	17.7
Imports	2.8	8.8	8.3	5.8	5.4	4.7	5.5	5.5	6.3	6.3	6.8	6.5
Exports	6.0	9.6	5.5	5.4	4.6	4.7	4.8	4.7	5.0	4.8	5.2	5.0
Beginning stocks	36.6	38.3	26.5	21.6	20.4	19.8	19.8	19.4	19.4	19.7	20.2	21.0
Ending stocks	38.3	26.5	21.6	20.4	19.8	19.8	19.4	19.4	19.7	20.2	21.0	21.7
of which intervention	5.7	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

The years indicated represent marketing year N/N+1 (i.e. 2009 0 2009/2010)

Soft wheat balance sheet in the European Union, 2009-2020 (million tons)

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Usable production	129.5	127.5	127.4	130.2	129.9	131.3	132.5	135.2	136.0	138.3	139.0	141.3
of which EU15	96.9	96.3	93.3	97.6	97.2	98.1	98.7	100.6	101.0	102.5	102.8	104.3
of which EU12	32.6	31.2	34.0	32.6	32.7	33.2	33.7	34.6	35.0	35.8	36.1	36.9
Consumption	119.7	114.7	118.8	118.3	120.1	120.5	122.4	123.6	125.1	126.1	127.0	127.9
of which EU15	95.7	92.4	95.5	94.8	96.4	96.7	98.5	99.4	100.9	101.6	102.6	103.2
of which EU12	24.1	22.3	23.4	23.5	23.8	23.8	23.9	24.1	24.2	24.4	24.5	24.7
of which food and industrial	46.9	47.1	47.9	47.6	47.6	47.7	47.7	47.9	47.9	48.1	48.2	48.4
of which feed	56.2	50.8	53.1	52.5	53.1	52.5	53.5	53.7	54.2	54.1	54.5	54.4
of which bioenergy	3.7	4.3	4.8	5.6	6.8	7.8	8.5	9.5	10.2	11.1	11.8	12.6
Imports	3.1	2.4	5.8	4.2	4.7	4.1	4.8	3.6	3.7	3.6	3.7	3.6
Exports	20.4	20.1	14.3	16.2	14.3	14.7	14.3	14.6	14.2	15.1	15.7	16.7
Beginning stocks	22.4	14.9	10.1	10.1	10.0	10.1	10.3	10.8	11.4	11.9	12.5	12.4
Ending stocks	14.9	10.1	10.1	10.0	10.1	10.3	10.8	11.4	11.9	12.5	12.4	12.6
of which intervention	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

The years indicated represent marketing year N/N+1 (i.e. 2009 0 2009/2010)

Durum wheat balance sheet in the European Union, 2009-2020 (million tons)

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Usable production	8.7	8.9	7.7	7.9	7.9	7.9	8.0	8.1	8.1	8.2	8.3	8.4
of which EU15	8.6	8.8	7.5	7.7	7.7	7.8	7.8	7.9	8.0	8.1	8.1	8.2
of which EU12	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Consumption	9.9	9.5	9.0	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.3	9.2
of which EU15	9.5	9.1	8.7	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8
of which EU12	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5
of which food and industrial	8.5	8.5	8.1	8.3	8.4	8.4	8.4	8.4	8.4	8.4	8.5	8.5
of which feed	0.6	0.3	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
of which bioenergy	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Imports	2.2	2.0	2.2	2.2	2.3	2.3	2.3	2.2	2.2	2.1	2.1	2.0
Exports	1.1	2.1	1.0	1.0	1.0	1.0	1.1	1.1	1.1	1.1	1.1	1.1
Beginning stocks	1.2	1.2	0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Ending stocks	1.2	0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4

The years indicated represent marketing year N/N+1 (i.e. 2009 0 2009/2010)

Barley balance sheet in the European Union, 2009-2020 (million tons)

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Usable production	62.0	53.2	51.3	52.6	52.4	52.6	52.6	53.2	53.3	53.6	53.7	54.0
of which EU15	50.7	43.4	41.2	42.5	42.3	42.5	42.5	42.9	43.0	43.2	43.3	43.5
of which EU12	11.4	9.8	10.2	10.1	10.0	10.1	10.1	10.3	10.3	10.4	10.4	10.5
Consumption	54.3	52.7	50.6	50.2	50.4	50.1	50.1	50.4	50.2	50.4	50.1	50.7
of which EU15	45.0	43.6	41.7	41.3	41.4	41.1	41.1	41.4	41.3	41.4	41.1	41.6
of which EU12	9.3	9.1	8.9	8.9	9.0	9.0	8.9	9.0	8.9	9.0	9.0	9.0
of which food and industrial	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
of which feed	41.9	40.3	38.0	37.8	37.8	37.5	37.3	37.5	37.2	37.5	37.1	37.5
of which bioenergy	0.4	0.6	0.7	0.7	1.0	1.1	1.2	1.4	1.5	1.5	1.7	1.8
Imports	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Exports	3.6	7.6	3.5	3.4	2.9	3.0	3.0	3.0	3.1	3.0	3.2	3.2
Beginning stocks	14.1	18.4	11.4	8.9	8.0	7.3	7.0	6.7	6.8	7.0	7.4	8.0
Ending stocks	18.4	11.4	8.9	8.0	7.3	7.0	6.7	6.8	7.0	7.4	8.0	8.4
of which intervention	5.5	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

The years indicated represent marketing year N/N+1 (i.e. 2009 0 2009/2010)

Maize balance sheet in the European Union, 2009-2020 (million tons)

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Usable production	57.8	57.4	61.1	61.1	61.8	63.2	64.0	65.6	66.8	68.1	69.2	70.6
of which EU15	37.1	34.9	37.7	37.5	37.6	38.1	38.2	38.8	39.2	39.6	39.9	40.4
of which EU12	20.7	22.5	23.4	23.6	24.2	25.1	25.8	26.8	27.6	28.5	29.3	30.3
Consumption	61.3	66.1	67.7	64.4	64.4	65.0	66.9	68.3	69.9	71.4	72.8	74.1
of which EU15	43.0	47.1	48.8	45.5	45.3	45.8	47.4	48.7	50.1	51.4	52.6	53.7
of which EU12	18.3	18.9	18.9	18.9	19.2	19.2	19.5	19.7	19.9	20.0	20.2	20.4
of which food and industrial	4.8	4.8	4.8	4.8	4.9	4.9	4.9	4.9	4.9	4.9	5.0	4.9
of which feed	48.1	51.9	53.2	49.2	47.9	47.3	48.4	48.6	49.0	49.1	49.3	49.5
of which bioenergy	2.4	3.3	3.8	4.2	5.6	6.7	7.6	8.8	9.9	11.2	12.4	13.5
Imports	2.4	7.5	6.9	4.8	4.3	3.7	4.3	4.3	5.1	5.1	5.6	5.3
Exports	2.1	1.8	1.8	1.7	1.5	1.5	1.6	1.6	1.7	1.6	1.8	1.6
Beginning stocks	17.8	14.7	11.8	10.2	10.1	10.3	10.6	10.4	10.5	10.6	10.8	11.0
Ending stocks	14.7	11.8	10.2	10.1	10.3	10.6	10.4	10.5	10.6	10.8	11.0	11.2
of which intervention	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

The years indicated represent marketing year N/N+1 (i.e. 2009 0 2009/2010)

Other cereals* balance sheet in the European Union, 2009-2020 (million tons)

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Usable production	36.0	30.9	29.9	30.5	30.5	30.6	30.5	30.7	30.7	30.7	30.7	30.8
of which EU15	18.5	15.7	15.5	15.9	15.9	15.9	15.9	15.9	15.9	15.9	15.9	15.9
of which EU12	17.5	15.1	14.4	14.6	14.6	14.7	14.7	14.7	14.8	14.8	14.8	14.9
Consumption	35.3	33.7	31.6	31.4	31.2	31.2	31.4	31.5	31.6	31.6	31.5	31.4
of which EU15	20.3	19.4	17.5	17.6	17.4	17.5	17.7	17.8	17.9	18.1	18.1	18.2
of which EU12	15.0	14.3	14.1	13.9	13.8	13.7	13.7	13.7	13.6	13.5	13.4	13.3
of which food and industrial	4.3	4.4	4.4	4.4	4.3	4.3	4.3	4.2	4.2	4.2	4.2	4.2
of which feed	25.8	24.2	22.2	21.7	21.4	21.1	21.2	21.1	21.1	21.0	20.9	20.8
of which bioenergy	1.1	1.2	1.3	1.4	1.8	2.0	2.2	2.4	2.5	2.5	2.5	2.5
Imports	0.2	1.1	1.2	0.9	0.9	0.8	1.0	1.0	1.0	1.0	1.0	1.0
Exports	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Beginning stocks	4.6	5.2	3.2	2.5	2.3	2.2	2.3	2.2	2.1	2.1	2.0	2.0
Ending stocks	5.2	3.2	2.5	2.3	2.2	2.3	2.2	2.1	2.1	2.0	2.0	2.2

* rye, oats and other cereals; # The years indicated represent marketing year N/N+1 (i.e. 2009 0 2009/2010)

Total oilseed* market balance in the European Union, 2009-2020 (million tons)

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Usable production	29.8	29.4	28.6	29.5	30.0	29.8	30.7	30.8	31.8	31.5	32.7	32.1
of which EU15	19.5	18.9	17.9	18.9	19.2	19.0	19.6	19.7	20.3	20.1	20.9	20.5
of which EU12	10.3	10.5	10.7	10.6	10.8	10.8	11.1	11.1	11.4	11.4	11.8	11.6
Consumption	45.8	46.8	45.1	46.6	47.7	47.4	48.3	48.0	49.3	48.7	50.5	49.3
of which EU15	39.4	40.2	38.6	40.1	41.1	40.8	41.7	41.4	42.5	42.0	43.6	42.6
of which EU12	6.4	6.5	6.5	6.5	6.6	6.6	6.7	6.6	6.8	6.7	6.9	6.8
Imports	16.5	17.4	17.8	17.8	18.3	18.2	18.3	17.9	18.3	17.9	18.5	17.9
Exports	0.9	0.8	0.7	0.7	0.6	0.6	0.7	0.7	0.7	0.7	0.7	0.7
Beginning stocks	4.9	4.5	3.7	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2
Ending stocks	4.5	3.7	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2

* rapeseed, soybeans, sunflower, cottonseed and groundnuts; # The years indicated represent marketing year N/N+1 (i.e. 2009 0 2009/2010)

Total oilseed meal* market balance in the European Union, 2009-2020 (million tons)

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Usable production	26.2	26.6	26.0	26.8	27.4	27.3	27.8	27.6	28.3	28.0	29.0	28.4
of which EU15	22.9	23.2	22.7	23.5	24.0	23.9	24.3	24.2	24.8	24.6	25.4	24.9
of which EU12	3.3	3.4	3.3	3.3	3.4	3.4	3.4	3.4	3.5	3.5	3.6	3.5
Consumption	50.0	52.7	51.2	51.7	52.6	52.4	52.9	53.2	53.6	53.7	54.1	54.3
of which EU15	42.8	45.4	43.9	44.3	45.0	44.8	45.2	45.4	45.7	45.7	45.9	46.1
of which EU12	7.2	7.3	7.4	7.4	7.6	7.6	7.7	7.8	8.0	7.9	8.1	8.1
Imports	24.5	26.8	25.9	25.5	25.9	25.7	25.8	26.2	25.9	26.3	25.7	26.5
Exports	0.8	0.8	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Beginning stocks	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Ending stocks	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2

* rapeseed meal, soybean meal, sunflower meal, cottonseed meal and groundnut meal;
# The years indicated represent marketing year N/N+1 (i.e. 2009 0 2009/2010)

Total oilseed oil* market balance in the European Union, 2009-2020 (million tons)

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Usable production	14.6	14.5	14.0	14.7	15.1	15.1	15.4	15.4	15.8	15.7	16.3	16.0
of which EU15	12.2	12.1	11.6	12.3	12.6	12.6	12.9	12.9	13.2	13.2	13.6	13.4
of which EU12	2.4	2.4	2.4	2.4	2.5	2.5	2.5	2.5	2.6	2.5	2.6	2.6
Consumption	16.1	15.9	15.6	16.2	16.6	16.9	17.2	17.5	17.7	18.0	18.2	18.3
of which EU15	13.8	13.6	13.3	13.8	14.2	14.4	14.7	15.0	15.2	15.5	15.7	15.8
of which EU12	2.3	2.3	2.3	2.3	2.4	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Imports	2.1	2.4	2.9	3.1	3.4	3.4	3.3	3.4	3.4	3.5	3.6	3.3
Exports	0.7	0.8	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.7	0.7
Beginning stocks	0.8	0.8	0.8	0.7	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Ending stocks	0.8	0.8	0.7	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8

* rapeseed oil, soybean oil, sunflower oil, cottonseed oil and groundnut oil;
# The years indicated represent marketing year N/N+1 (i.e. 2009 0 2009/2010)

Total vegetable oil* market balance in the European Union, 2009-2020 (million tons)

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Usable production	14.6	14.5	14.0	14.7	15.1	15.1	15.4	15.4	15.8	15.7	16.3	16.0
of which EU15	12.2	12.1	11.6	12.3	12.6	12.6	12.9	12.9	13.2	13.2	13.6	13.4
of which EU12	2.4	2.4	2.4	2.4	2.5	2.5	2.5	2.5	2.6	2.5	2.6	2.6
Consumption	23.3	22.4	22.6	23.3	23.9	24.2	24.6	24.9	25.3	25.6	26.1	26.1
of which EU15	20.7	19.7	19.9	20.6	21.1	21.4	21.7	22.0	22.3	22.6	23.0	23.1
of which EU12	2.6	2.7	2.7	2.7	2.8	2.9	2.9	3.0	3.0	3.0	3.0	3.1
of which bioenergy	9.1	9.1	9.5	10.6	11.8	12.3	12.7	13.0	13.6	13.7	14.2	13.9
Imports	9.4	9.0	10.0	10.4	10.9	10.9	10.9	11.0	11.2	11.3	11.6	11.3
Exports	0.9	1.0	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.9	0.9
Beginning stocks	1.1	1.0	1.0	0.9	1.1	1.1	1.1	1.0	1.1	1.1	1.1	1.1
Ending stocks	1.0	1.0	0.9	1.1	1.1	1.1	1.0	1.1	1.1	1.1	1.1	1.1

* rapeseed oil, soybean oil, sunflower oil, cottonseed oil, groundnut oil, palm oil, palmkernel oil and coconut oil;
# The years indicated represent marketing year N/N+1 (i.e. 2009 0 2009/2010)

Area under arable crops in the EU, 2009-2020 (million hectar)

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Cereals	58.4	56.2	55.5	56.1	55.7	55.8	55.6	55.9	55.8	56.0	55.8	56.0
of which EU15	35.4	34.4	33.9	34.3	34.1	34.1	34.0	34.2	34.1	34.2	34.1	34.2
of which EU12	23.0	21.8	21.6	21.8	21.6	21.7	21.6	21.7	21.7	21.7	21.7	21.8
of which soft wheat	22.8	23.0	23.1	23.4	23.3	23.3	23.3	23.5	23.5	23.7	23.6	23.8
of which durum wheat	2.8	2.8	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
of which barley	13.9	12.3	11.9	12.0	12.0	11.9	11.9	11.9	11.8	11.8	11.7	11.7
of which maize	8.4	8.2	8.7	8.7	8.7	8.8	8.8	8.9	9.0	9.0	9.1	9.1
of which rye	2.8	2.6	2.3	2.4	2.4	2.4	2.3	2.3	2.3	2.3	2.3	2.3
of which other cereals	7.7	7.3	7.0	7.0	6.9	6.9	6.8	6.8	6.7	6.7	6.6	6.6
Oilseeds	10.7	10.9	11.3	11.2	11.2	11.1	11.2	11.2	11.3	11.2	11.4	11.2
of which EU15	6.0	6.0	6.2	6.2	6.2	6.1	6.2	6.1	6.2	6.2	6.3	6.1
of which EU12	4.7	4.9	5.1	5.0	5.1	5.0	5.1	5.0	5.1	5.0	5.1	5.0
of which rapeseed	6.5	6.9	6.7	6.7	6.8	6.7	6.8	6.8	6.9	6.8	7.0	6.8
of which sunseed	3.9	3.7	4.2	4.1	4.1	4.0	4.0	4.0	4.0	3.9	4.0	3.9
of which soyabeans	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Sugar beet	1.6	1.6	1.6	1.6	1.7	1.7	1.8	1.8	1.8	1.9	1.9	1.9
Protein crops	0.9	1.2	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Total selected arable crops	71.6	69.9	69.6	70.0	69.7	69.6	69.8	70.0	70.1	70.1	70.2	70.2
Total utilized agricultural area	177.6	177.5	177.3	177.2	177.1	177.0	176.9	176.8	176.7	176.6	176.5	176.4

Total biofuels balance sheet in the European Union, 2009-2020 (billion litres)

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Usable production	15.8	16.7	18.1	20.3	23.6	25.6	27.3	29.3	31.5	33.4	35.5	36.7
of which Ethanol	5.6	6.4	7.2	8.1	9.8	11.1	12.0	13.3	14.5	15.9	17.0	18.2
of which 2nd gen.	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.2	0.2	0.3	0.3	0.4
of which Biodiesel	10.2	10.3	10.9	12.2	13.7	14.6	15.3	16.0	17.0	17.5	18.5	18.5
of which 2nd gen.	0.4	0.5	0.7	0.9	1.1	1.4	1.7	2.1	2.4	2.8	3.2	3.6
Consumption	18.8	21.0	20.8	22.2	25.2	29.0	32.8	36.3	38.8	41.3	43.2	45.0
of which Ethanol	6.7	8.0	8.5	9.2	11.5	14.2	16.4	18.6	20.4	22.1	23.2	24.2
non fuel use of ethanol	2.3	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
of which Biodiesel	12.1	13.0	12.4	13.0	13.7	14.9	16.3	17.6	18.4	19.2	20.0	20.8
Net trade	-3.0	-4.2	-2.7	-1.9	-1.6	-3.4	-5.5	-7.0	-7.3	-7.9	-7.7	-8.3
of which Ethanol	-1.1	-1.6	-1.3	-1.1	-1.7	-3.1	-4.5	-5.3	-5.9	-6.2	-6.1	-6.1
of which Biodiesel	-1.9	-2.7	-1.5	-0.8	0.1	-0.3	-1.0	-1.7	-1.4	-1.7	-1.5	-2.3
Biofuels energy share (% RED counting)	4.1	4.6	4.5	4.8	5.4	6.2	7.0	7.8	8.4	9.0	9.5	10.0
1st generation	3.9	4.2	4.1	4.3	4.8	5.4	6.1	6.7	7.1	7.5	7.7	8.0
2nd generation	0.1	0.2	0.2	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
Ethanol	5.0	5.3	5.0	5.2	5.4	5.8	6.3	6.8	7.1	7.4	7.7	8.0
Biodiesel	2.2	2.7	3.0	3.3	4.5	5.9	7.0	8.1	9.0	9.9	10.5	11.0
Diesel consumption (billion litres)	222.2	224.8	227.6	230.4	233.2	236.0	238.7	238.8	238.8	238.9	238.9	238.9
Gasoline consumption (billion litres)	138.0	136.1	135.6	135.1	134.6	134.1	133.6	133.3	133.0	132.7	132.4	132.1

Total sugar balance sheet in the European Union, 2009-2020 (million tons white sugar equivalent)

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Sugar beet production (million tons)	114.4	106.8	112.1	108.3	111.7	112.6	117.6	119.8	122.1	123.7	124.9	128.1
of which EU15	97.3	90.6	95.0	91.5	94.2	94.8	98.7	100.1	101.5	102.2	102.6	104.6
of which EU12	17.0	16.2	17.1	16.7	17.5	17.8	18.9	19.7	20.6	21.5	22.3	23.6
of which for ethanol	17.1	18.2	20.6	23.1	26.9	28.1	29.3	31.2	33.6	36.6	38.5	40.2
of which processed to sugar	97.2	88.5	91.5	85.2	84.7	84.5	88.3	88.6	88.5	87.1	86.3	87.9
Sugar production*	16.2	14.5	16.5	14.4	14.4	14.3	15.0	15.0	15.0	14.8	14.6	14.9
Sugar quota	13.3	13.3	13.3	13.3	13.3	13.3	0.0	0.0	0.0	0.0	0.0	0.0
of which EU15	13.3	11.9	13.5	11.6	11.4	11.3	11.8	11.7	11.5	11.2	10.9	10.9
of which EU12	2.9	2.6	3.0	2.8	2.9	3.0	3.2	3.3	3.5	3.6	3.7	4.0
Consumption	16.5	16.5	16.7	16.6	16.6	16.6	16.6	16.7	16.7	16.7	16.6	16.6
Imports	3.0	4.2	3.5	4.4	4.4	3.9	3.4	3.9	3.9	4.0	4.0	3.9
Exports	3.2	1.9	2.5	2.0	1.9	1.9	2.0	2.0	2.0	2.0	1.9	1.9
Beginning stocks**	2.3	1.7	2.0	2.9	3.1	3.4	3.1	2.9	3.1	3.3	3.4	3.5
Ending stocks**	1.7	2.0	2.9	3.1	3.4	3.1	2.9	3.1	3.3	3.4	3.5	3.9

* Sugar production is adjusted for carry forward quantities and does not include ethanol feedstock quantities.

** Stocks include carry forward quantities.; # The years indicated represent marketing year N/N+1 (i.e. 2009 0 2009/2010)

Beef and veal meat market projections for the EU-27, 2009-2020 (thousand tons c.w.e.)

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Gross Indigenous Production	7 987	8 228	8 371	8 201	8 153	8 174	8 145	8 190	8 200	8 179	8 161	8 124
of which EU15	7 131	7 357	7 496	7 332	7 292	7 310	7 289	7 328	7 322	7 298	7 284	7 250
of which EU12	856	871	875	869	861	864	857	863	878	881	877	874
Imports of live animals	1	0	0	0	0	0	0	0	0	0	0	0
Exports of live animals	61	116	150	143	130	120	110	100	90	80	75	70
Net Production	7 928	8 112	8 221	8 058	8 024	8 054	8 035	8 091	8 111	8 099	8 086	8 054
Imports (meat)	359	319	288	319	312	302	317	313	309	313	319	323
Exports (meat)	91	255	350	248	256	260	257	261	262	271	274	264
Consumption	8 196	8 177	8 157	8 135	8 071	8 102	8 099	8 142	8 153	8 142	8 134	8 115
of which EU15	7 616	7 593	7 589	7 568	7 510	7 538	7 538	7 580	7 591	7 581	7 574	7 557
of which EU12	580	584	568	567	562	563	561	562	562	561	560	558
per capita consumption (kg)	16.38	16.31	16.22	16.15	15.99	16.00	15.95	15.99	15.98	15.92	15.86	15.79
of which EU15	19.18	19.07	18.99	18.88	18.68	18.68	18.61	18.66	18.63	18.54	18.47	18.37
of which EU12	5.61	5.66	5.50	5.50	5.46	5.47	5.45	5.46	5.47	5.46	5.46	5.44

Sheep and goat meat market projections for the EU-27, 2009-2020 (thousand tons c.w.e.)

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Gross Indigenous Production	914	886	888	864	863	854	849	844	837	830	823	816
of which EU15	819	795	798	775	772	764	760	755	748	742	735	728
of which EU12	95	91	90	88	91	90	90	89	89	89	88	88
Imports of live animals	0	0	0	0	0	0	0	0	0	0	0	0
Exports of live animals	4	11	20	18	14	10	10	10	10	10	10	10
Net Production	910	875	868	845	849	844	839	834	827	820	813	806
Imports (meat)	271	239	218	250	259	272	274	270	271	270	271	270
Exports (meat)	8	13	15	14	15	15	15	15	15	15	15	15
Consumption	1 174	1 101	1 071	1 082	1 093	1 101	1 099	1 088	1 083	1 075	1 069	1 061
of which EU15	1 091	1 022	993	1 003	1 015	1 023	1 022	1 012	1 007	1 000	994	987
of which EU12	83	79	78	79	78	77	76	76	75	75	75	74
per capita consumption (kg)	2.35	2.20	2.13	2.15	2.16	2.17	2.16	2.14	2.12	2.10	2.08	2.07
of which EU15	2.75	2.57	2.48	2.50	2.53	2.54	2.52	2.49	2.47	2.45	2.42	2.40
of which EU12	0.80	0.76	0.76	0.77	0.75	0.75	0.74	0.74	0.73	0.73	0.73	0.72

Pig meat market projections for the EU-27, 2009-2020 (thousand tons c.w.e.)

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Gross Indigenous Production	22 063	22 603	22 986	22 971	23 127	23 194	23 333	23 252	23 310	23 414	23 419	23 411
of which EU15	18 743	19 273	19 445	19 452	19 572	19 695	19 797	19 746	19 777	19 880	19 898	19 870
of which EU12	3 321	3 330	3 541	3 519	3 556	3 499	3 535	3 506	3 533	3 534	3 522	3 541
Imports of live animals	0	0	0	0	0	0	0	0	0	0	0	0
Exports of live animals	120	78	79	66	65	65	65	65	65	65	65	65
Net Production	21 944	22 525	22 907	22 905	23 063	23 129	23 268	23 187	23 246	23 350	23 355	23 346
Imports (meat)	39	29	24	25	21	23	22	21	21	22	22	22
Exports (meat)	1 569	1 876	2 125	2 013	2 211	2 114	2 157	2 029	1 996	2 017	1 977	1 978
Consumption	20 413	20 682	20 806	20 917	20 873	21 039	21 134	21 180	21 271	21 355	21 399	21 390
of which EU15	16 173	16 402	16 535	16 668	16 593	16 793	16 856	16 906	16 986	17 061	17 101	17 086
of which EU12	4 240	4 280	4 271	4 249	4 280	4 246	4 278	4 273	4 285	4 294	4 298	4 304
per capita consumption (kg)	40.80	41.23	41.38	41.52	41.35	41.55	41.61	41.60	41.68	41.75	41.73	41.62
of which EU15	40.74	41.19	41.37	41.59	41.28	41.62	41.62	41.62	41.68	41.73	41.69	41.52
of which EU12	41.03	41.46	41.42	41.25	41.59	41.27	41.57	41.56	41.70	41.83	41.90	41.99

Poultry meat market projections for the EU-27, 2009-2020 (thousand tons c.w.e.)

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Gross Indigenous Production	11 691	11 975	11 972	12 048	12 127	12 138	12 108	12 152	12 209	12 255	12 353	12 405
of which EU15	9 131	9 434	9 434	9 497	9 612	9 605	9 565	9 589	9 635	9 671	9 758	9 800
of which EU12	2 560	2 541	2 538	2 551	2 515	2 533	2 544	2 562	2 574	2 584	2 594	2 605
Imports of live animals	0	1	1	1	1	1	1	1	1	1	1	1
Exports of live animals	7	8	9	9	9	9	9	9	9	9	9	9
Net Production	11 685	11 967	11 964	12 040	12 119	12 130	12 100	12 144	12 201	12 247	12 345	12 397
Imports (meat)	849	779	786	786	777	790	815	827	829	830	830	835
Exports (meat)	940	1 159	1 375	1 358	1 315	1 218	1 155	1 132	1 123	1 115	1 163	1 108
Consumption	11 593	11 588	11 375	11 468	11 580	11 701	11 761	11 839	11 907	11 962	12 012	12 124
of which EU15	8 863	8 868	8 759	8 794	8 909	9 010	9 070	9 136	9 191	9 229	9 261	9 352
of which EU12	2 730	2 720	2 616	2 674	2 671	2 692	2 691	2 703	2 716	2 733	2 750	2 772
per capita consumption (kg)	23.17	23.11	22.62	22.76	22.94	23.11	23.16	23.26	23.33	23.39	23.43	23.59
of which EU15	22.32	22.27	21.92	21.94	22.17	22.33	22.40	22.49	22.55	22.57	22.58	22.73
of which EU12	26.42	26.35	25.37	25.96	25.96	26.16	26.15	26.29	26.43	26.62	26.81	27.04

Aggregate meat market projections for the EU-27, 2009-2020 (thousand tons c.w.e.)

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Gross Indigenous Production	42 656	43 691	44 217	44 083	44 270	44 359	44 435	44 438	44 557	44 679	44 756	44 756
of which EU15	35 824	36 858	37 173	37 056	37 248	37 374	37 410	37 418	37 483	37 591	37 675	37 648
of which EU12	6 831	6 833	7 044	7 027	7 023	6 985	7 025	7 020	7 074	7 087	7 081	7 107
Imports of live animals	2	1	2	1	2	2	2	2	2	2	2	2
Exports of live animals	191	213	258	235	218	204	194	184	174	164	159	154
Net Production	42 467	43 479	43 961	43 850	44 054	44 157	44 243	44 256	44 385	44 516	44 599	44 603
Imports (meat)	1 518	1 367	1 317	1 380	1 368	1 387	1 429	1 431	1 430	1 435	1 441	1 450
Exports (meat)	2 609	3 303	3 866	3 634	3 796	3 607	3 583	3 438	3 397	3 418	3 429	3 365
Consumption	41 376	41 547	41 409	41 602	41 617	41 942	42 092	42 249	42 414	42 534	42 613	42 691
of which EU15	33 743	33 885	33 876	34 032	34 027	34 364	34 486	34 634	34 776	34 871	34 930	34 983
of which EU12	7 632	7 663	7 533	7 570	7 590	7 578	7 606	7 614	7 638	7 663	7 683	7 708
per capita consumption (kg)	82.69	82.84	82.36	82.58	82.44	82.82	82.88	82.99	83.12	83.15	83.11	83.06
of which EU15	84.99	85.09	84.76	84.92	84.66	85.17	85.16	85.25	85.33	85.29	85.16	85.02
of which EU12	73.86	74.23	73.04	73.48	73.76	73.64	73.92	74.06	74.34	74.64	74.89	75.19
of which Beef and Veal meat	16.38	16.31	16.22	16.15	15.99	16.00	15.95	15.99	15.98	15.92	15.86	15.79
of which Sheep and Goat meat	2.35	2.20	2.13	2.15	2.16	2.17	2.16	2.14	2.12	2.10	2.08	2.07
of which Pig meat	40.80	41.23	41.38	41.52	41.35	41.55	41.61	41.60	41.68	41.75	41.73	41.62
of which Poultry meat	23.17	23.11	22.62	22.76	22.94	23.11	23.16	23.26	23.33	23.39	23.43	23.59

Milk supply and utilisation in the EU-27, 2009-2020

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Dairy cows (mio heads)	23.6	23.1	23.0	22.5	22.3	21.9	21.8	21.6	21.5	21.5	21.4	21.4
of which EU15	17.8	17.6	17.6	17.3	17.2	16.9	16.9	16.8	16.8	16.8	16.7	16.7
of which EU12	5.8	5.5	5.4	5.2	5.1	5.0	4.9	4.8	4.8	4.7	4.7	4.7
Milk yield (kg/dairy cow)	6,256	6,419	6,567	6,712	6,802	6,921	7,022	7,132	7,204	7,268	7,328	7,360
of which EU15	6,731	6,895	7,032	7,161	7,226	7,358	7,444	7,561	7,629	7,672	7,722	7,731
of which EU12	4,795	4,908	5,044	5,221	5,364	5,440	5,568	5,644	5,712	5,834	5,930	6,034
Milk production (mio t)	147.6	148.5	150.8	151.1	151.5	151.8	152.7	154.4	155.2	156.1	157.1	157.6
of which EU15	119.8	121.3	123.7	123.9	124.3	124.6	125.5	127.1	127.9	128.5	129.2	129.3
of which EU12	27.8	27.2	27.1	27.2	27.2	27.2	27.2	27.3	27.3	27.6	27.9	28.3
Delivered to dairies (mio t)	133.2	134.7	137.2	137.7	138.1	138.6	139.6	141.4	142.2	143.3	144.3	144.9
of which EU15	114.7	116.6	119.1	119.3	119.7	120.1	121.0	122.6	123.4	124.0	124.7	124.9
of which EU12	18.5	18.1	18.1	18.4	18.4	18.5	18.6	18.8	18.8	19.2	19.6	20.1
On-farm use and direct sales (mio t)	14.4	13.8	13.6	13.5	13.3	13.2	13.1	13.0	12.9	12.8	12.7	12.6
of which EU15	5.2	4.7	4.6	4.6	4.6	4.5	4.5	4.5	4.5	4.5	4.5	4.4
of which EU12	9.2	9.1	9.0	8.9	8.8	8.7	8.6	8.5	8.4	8.4	8.3	8.2
Delivery ratio (in %)	90.2	90.7	91.0	91.1	91.2	91.3	91.4	91.6	91.7	91.8	91.9	92.0
of which EU15	95.7	96.1	96.3	96.3	96.3	96.4	96.4	96.5	96.5	96.5	96.5	96.6
of which EU12	66.7	66.5	66.9	67.4	67.8	68.0	68.4	68.8	69.1	69.7	70.3	71.0
Fat content of milk (in %)	4.03	4.04	4.04	4.04	4.04	4.04	4.04	4.03	4.03	4.03	4.03	4.03
Non-fat solid content of milk (in %)	9.28	9.29	9.29	9.29	9.29	9.29	9.29	9.29	9.29	9.29	9.29	9.29

Cheese market projections for the EU-27, 2009-2020 (thousand tons)

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Production	8 680	8 704	8 794	8 894	8 936	9 030	9 142	9 234	9 305	9 380	9 450	9 542
of which EU15	7 510	7 524	7 610	7 666	7 699	7 749	7 824	7 892	7 950	8 014	8 072	8 147
of which EU12	1 170	1 180	1 184	1 228	1 237	1 281	1 318	1 342	1 355	1 366	1 379	1 395
Imports	84	84	85	80	80	81	82	82	82	82	81	81
Exports	578	676	695	717	684	695	703	707	708	705	717	727
Consumption	8 191	8 116	8 183	8 257	8 332	8 416	8 521	8 609	8 678	8 757	8 815	8 896
of which EU15	7 112	7 159	7 207	7 196	7 263	7 326	7 410	7 492	7 549	7 612	7 655	7 719
of which EU12	1 079	957	975	1 062	1 069	1 089	1 111	1 117	1 129	1 145	1 160	1 177
per capita consumption (kg)	16.37	16.18	16.28	16.39	16.50	16.62	16.78	16.91	17.01	17.12	17.19	17.31
of which EU15	17.91	17.98	18.03	17.95	18.07	18.16	18.30	18.44	18.52	18.62	18.66	18.76
of which EU12	10.44	9.27	9.46	10.31	10.39	10.59	10.80	10.87	10.99	11.15	11.30	11.49

Butter market projections for the EU-27, 2009-2020 (thousand tons)

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Production	2 137	2 078	2 103	2 124	2 113	2 115	2 113	2 116	2 108	2 109	2 105	2 108
of which EU15	1 886	1 841	1 867	1 884	1 876	1 873	1 869	1 870	1 865	1 867	1 866	1 869
of which EU12	251	237	236	240	237	243	244	246	243	242	239	240
Imports	63	40	38	26	29	30	30	30	31	31	31	31
Exports	154	161	144	145	125	134	140	140	133	130	128	129
Consumption	1 999	1 993	2 014	2 014	2 017	2 010	2 005	2 007	2 006	2 007	2 006	2 010
of which EU15	1 800	1 800	1 823	1 824	1 827	1 820	1 816	1 818	1 816	1 817	1 816	1 819
of which EU12	199	193	191	190	190	190	189	189	189	190	190	190
per capita consumption (kg)	4.00	3.98	4.01	4.00	4.00	3.97	3.95	3.94	3.93	3.92	3.91	3.91
of which EU15	4.54	4.53	4.56	4.55	4.55	4.51	4.49	4.47	4.46	4.44	4.43	4.42
of which EU12	1.93	1.87	1.85	1.84	1.85	1.84	1.84	1.84	1.84	1.85	1.85	1.86
Ending Stocks	115	73	56	47	48	50	47	46	47	49	51	51
of which private	38	71	56	47	48	50	47	46	47	49	51	51
of which intervention	77	2	0	0	0	0	0	0	0	0	0	0

SMP market projections for the EU-27, 2009-2020 (thousand tons)

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Production	941	904	983	1 022	1 017	1 017	1 015	1 026	1 020	1 022	1 029	1 035
of which EU15	779	748	816	846	837	835	835	846	842	843	849	855
of which EU12	162	156	167	176	180	182	180	179	179	179	181	180
Imports	6	4	2	2	3	3	3	3	3	3	3	3
Exports	231	378	486	491	412	419	412	418	418	430	438	443
Consumption	647	599	571	597	595	603	609	606	599	592	590	591
of which EU15	571	518	496	521	520	528	534	531	524	518	517	517
of which EU12	75	80	76	76	75	75	75	75	74	74	74	74
Ending Stocks	278	209	137	72	85	83	80	85	92	95	99	104
of which private	20	23	84	72	85	83	80	85	92	95	99	104
of which intervention	258	186	53	0	0	0	0	0	0	0	0	0

WMP market projections for the EU-27, 2009-2020 (thousand tons)

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Production	762	757	756	760	753	769	767	771	776	780	789	788
of which EU15	703	703	702	704	696	709	707	710	714	718	727	727
of which EU12	60	54	54	56	57	60	60	61	62	62	62	62
Imports	1	2	1	1	1	1	1	1	1	1	1	1
Exports	459	442	420	398	402	419	419	424	428	433	442	441
Consumption	305	318	338	363	351	350	349	348	348	348	348	348
of which EU15	269	279	300	326	314	313	313	312	312	312	312	312
of which EU12	36	39	37	37	37	37	37	37	36	36	36	37

Agricultural factor income in the European Union, 2009-2020 (average 2007-2011 = 100)

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Factor income in nominal terms	88.0	98.6	104.1	103.5	103.6	100.9	98.7	99.3	99.6	98.7	100.4	99.5
EU15	88.0	99.3	101.0	102.1	101.0	98.2	95.7	95.8	96.1	95.0	96.9	95.7
EU12	87.8	95.1	119.1	110.5	116.1	114.3	113.8	116.7	117.2	117.0	117.9	118.0
Factor income in real terms	89.2	98.0	101.8	99.4	97.7	93.2	89.3	87.9	86.5	84.0	83.8	81.4
EU15	88.6	98.5	99.2	98.5	95.8	91.3	87.1	85.4	84.1	81.5	81.5	79.0
EU12	92.6	95.0	115.5	104.3	106.3	101.9	99.0	99.0	97.1	94.6	93.1	91.1
Labour input	99.9	97.4	94.8	92.2	89.8	87.5	85.2	83.0	80.9	78.8	76.8	74.8
EU15	99.2	98.4	96.4	94.6	92.9	91.3	89.7	88.1	86.5	85.0	83.5	82.0
EU12	100.6	96.4	93.3	89.9	86.8	83.8	80.9	78.2	75.5	72.9	70.4	68.0
Factor income per labour unit (real terms)	89.2	100.5	107.3	107.8	108.7	106.5	104.7	105.9	106.9	106.6	109.1	108.7
EU15	89.4	100.2	102.9	104.2	103.2	100.0	97.2	97.0	97.2	96.0	97.7	96.5
EU12	91.6	98.1	123.3	115.5	121.9	121.0	121.7	126.1	128.0	129.3	131.7	133.4

PART II Quantitative analysis of uncertainties

7 Introduction - baseline projections and uncertainties

The outlook for EU agricultural markets and income presented in Part I of the publication (the baseline) is based on a specific set of assumptions (described in Chapter 1) regarding the future economic, market and policy environment. In addition, the baseline assumes normal weather conditions, steady demand and yield trends and no disruptions caused by factors like animal disease outbreaks or food safety issues. As such, the baseline projections depict rather smooth market developments, while in reality markets tend to move along a more volatile path as observed in the past and particularly over recent years.

The uncertainty analysis was carried out at the JRC-IPTS[9] using two different agricultural sector models, namely the Commission's updated AGLINK-COSIMO[10] and CAPRI[11], and the general equilibrium model GLOBE.[12]

Among the assumptions underlying the baseline, those concerning the general economic outlook are currently characterised by particularly high uncertainty and are subject to ongoing adjustment. Indeed, whereas in the draft version of this analysis presented at the outlook workshop GDP growth was assumed to accelerate from its current slow rate, the latest developments and expert discussions presented in that workshop motivated a rerun the baseline with reduced growth assumptions for the next two years.

However, even gloomier downside risks are foreseen by some commentators, and the scenario in which Europe slides into a double-dip recession (with the economy emerging from recession for a short period of growth, but quickly falling back into recession thereafter) can no longer be excluded. Current global economic and financial imbalances could trigger further disruptive exchange-rate developments and the use of trade-distorting policy measures in some countries cannot be ruled out.

Changes in the general macroeconomic situation could also alter agricultural market projections through their impacts on asset values, access to credit, energy prices and demand prospects. Apart from macroeconomic aspects, there are other factors that can have far-reaching implications for future outcomes in EU agricultural markets, such as the path of technological change and future climatic conditions.

Last year’s outlook publication addressed a selection of these issues on a quantitative basis using sensitivity and scenario analyses. Alternative assumptions regarding drivers of demand and supply, the general macroeconomic setting and prospects for biofuel markets that could influence the projected agricultural market developments were analysed.

This 2011 edition goes further by providing, in addition to scenario analysis, a systematic partial stochastic analysis that helps to identify *which* uncertainties regarding the assumptions

9 Contributing authors include. A. Burrell, E. Ferrari, S. Hélaine, M. Himics, R. M'barek, O. Nekhay, Z. Nii-Naate, S. Shrestha, B. Van Doorslaer and P. Ciaian.

10 The results of any analysis based on the use of the AGLINK-COSIMO model by parties outside the OECD are not endorsed by the Secretariat, and the Secretariat cannot be held responsible for them. It is therefore inappropriate for outside users to suggest or to infer that these results or interpretations based on them can in any way be attributed to the OECD Secretariat or to the Member countries of the Organisation.

11 Britz W. and Witzke H.-P. (eds.) 2008. CAPRI Model Documentation 2008: Version 2 p. Bonn: Institute for Food and Resource Economics, University of Bonn. (available at http://www.capri-model.org/docs/capri_documentation.pdf). The CAPRI model is calibrated to the AGLINK-COSIMO baseline.

12 McDonald, S., Thierfelder, K. and Robinson, S., (2007). 'Globe: A SAM Based Global CGE Model using GTAP Data', Economics Working Paper, US Naval Academy, Annapolis, USA.

have the strongest implications for the baseline projections, and *which* sectors or products are most affected.

The chapters analysing the implications of these uncertainties are organised according to the methodological approaches and cover the different markets as presented in the deterministic baseline. Starting from EU-27, results are presented at different spatial scales partly including the regional level (NUTS2).

The **eighth chapter** describes partial stochastic simulations that were undertaken to examine the impact of alterative macroeconomic settings on agricultural market developments. AGLINK-COSIMO does not cover non-agricultural markets, and therefore its simulations are conditional on exogenous assumptions about the situation in the rest of the economy at global and country level. To assess the extent to which uncertainty regarding these assumptions implies uncertainty with respect to the simulated baseline, a large number of simulations were run, each one based on a particular assumed set of 'possible' macroeconomic conditions. These alternative settings were based on past macroeconomic forecast errors, and the correlations between them, which were assumed to follow a multivariate normal distribution. 500 draws of GDP growth, CPI, GDP deflator, oil price and US dollar/euro exchange rate were made from this distribution, the baseline was simulated for each of them and the results reported.

The **ninth chapter** presents partial stochastic simulations based on a range of 'possible' EU crop yields, in order to assess to what extent uncertainty about yields is translated into uncertainty regarding the baseline results.

The **tenth chapter** compares the consequences of macroeconomic and yield uncertainty.

Chapter eleven reports the methodology and results of an approach involving two models that measures the sensitivity of the EU agricultural market projections to assumptions about the growth rate of Chinese GDP. The general equilibrium model GLOBE was used in a first stage to generate a set of new macroeconomic assumptions consistent with an assumed slower rate of growth in China. These assumptions were then fed into AGLINK-COSIMO and the changes in agricultural market and trade outcomes, relative to those of the 'standard' baseline, were calculated.

Chapter twelve shows the impacts of higher operating costs in the EU on production, trade balances, and on farm incomes at a regional level.

8 Uncertainties in EU Macroeconomic Variables

The outlook projections presented in Part 1 of this report are based on specific assumptions regarding macroeconomic conditions, policies, weather, and international trade developments. It follows that the outlook for EU agricultural markets is subject to a number of uncertainties related to these assumptions and that are exogenous to the functioning of these markets. Based on the results of partial stochastic simulations, this chapter and the following chapter focus on the implications for EU agricultural market projections, particularly price developments, of macroeconomic and weather uncertainties, respectively. It is important to note that the main reason for running partial stochastic simulations is not to improve the macroeconomic projections but to ascertain the degree of uncertainty in the baseline projections. The methodology for assessing the consequences of macroeconomic uncertainties for the baseline projections is set out below. Further methodological details will be available in a JRC Scientific and Technical report to be published in 2012.

8.1 Scenario setting

The simulations were carried out using the IPTS/DG-AGRI partial stochastic version of DG-AGRI's updated 2011 AGLINK-COSIMO model, which is also used in Part I of this report. AGLINK-COSIMO is a partial equilibrium model covering agricultural markets and trade for the main agricultural commodities. Non-agricultural markets are not modelled and are treated as exogenous to the model. The macroeconomic setting plays a pivotal role in the agricultural baseline for various reasons. For example, EU competitiveness depends a lot on the USD/EUR exchange rate, the level of food consumption is linked to total household income and the incentive to produce biofuels depends on the crude oil price.

Partial stochastic analysis of the macroeconomic environment is undertaken with respect to nine key variables for EU-15 and EU-12:

- EU-15 and EU-12 Gross Domestic Product (GDP), expressed as an index, which is used as a proxy for consumer income;
- EU-15 and EU-12 Consumer Price Index (CPI), expressed as an index. It measures changes in the price level of consumer goods and services purchased by households and it is used to deflate nominal consumer prices;
- EU-15, EU-12 and US[13] Gross Domestic Product Deflator, which is used as a proxy for economy-wide inflation;
- the USD/EUR exchange rate, expressed as the US dollar price of one euro, which reflects fluctuations in relative competitiveness; and
- the world oil price, which is the Brent crude oil price in USD per barrel.

In order to build stochastic simulations of macroeconomic variables, we first need to estimate a typical shock to the macro economy. The European Commission (EC) produces two complete sets of short-term macroeconomic forecasts each year. The evolution of macroeconomic variables is predetermined with no account taken of any feedback from developments in agricultural markets to the economy as a whole. Rather, we incorporate the EC's macroeconomic forecast errors of the above macroeconomic variables into the simulation model. In this exercise, we define the forecast errors of macroeconomic variables to be the realisation at time t minus the forecast made 18 months earlier. For simplicity, we assume that each year's forecasts are unbiased at the time they are made. However,

13 This is the only third-country uncertainty that was taken into account.

macroeconomic forecast errors accumulate over time as the uncertainty of long-term forecasts is greater than for short-term ones.

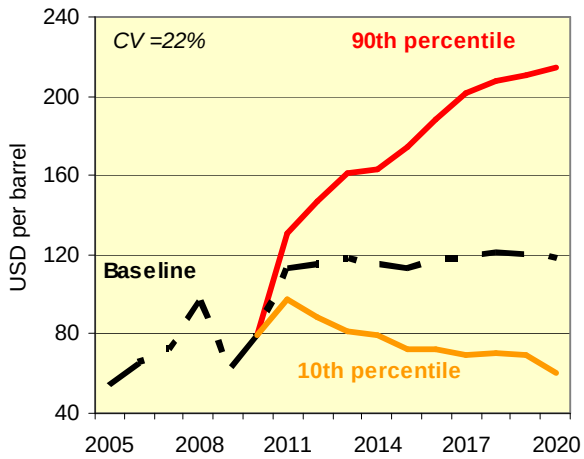
The forecast errors are assumed to follow a multivariate normal statistical distribution. We take 500 draws of the macroeconomic forecast errors from this multivariate distribution and incorporate them into the baseline macroeconomic forecast. This results in a set of 500 alternative baseline projections that lie within the boundaries of what *might* be possible, given past levels of uncertainty.

Consistent with the economic literature and casual observation, the forecast errors for the GDP deflator, real GDP and the CPI are relatively small (see Graphs 8.3 to 8.6). By contrast, forecasting exchange rate fluctuations and oil prices is very difficult. Consequently, the (past) forecast errors and spread of (future) possible projected values of the USD/EUR exchange rate and the oil price are significantly larger than for the GDP deflator, real GDP and CPI.

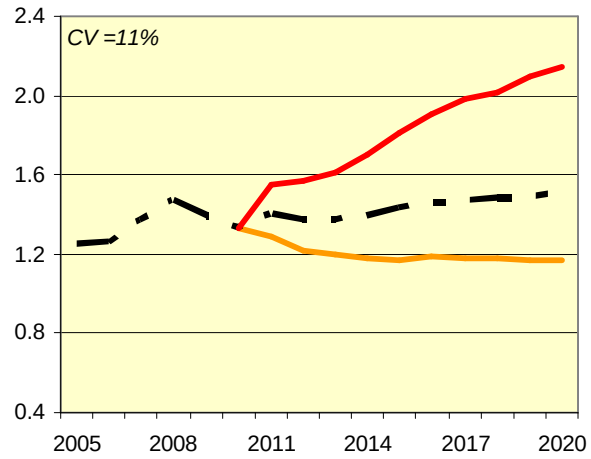
A key statistic used throughout this part of the publication is the average annual coefficient of variation (CV), which measures *variability relative to the mean*. It is defined as the ratio of the average standard deviation of a particular variable (taking values between the 10th and 90th percentiles, i.e. over the 400 'central' values out of the 500 simulation runs) to the average mean of that variable (also calculated from values between the 90th and 10th percentile), from 2011 to 2020. This is an indicator of the extent to which uncertainty in the macroeconomic assumptions translates into uncertainty in the non-stochastic baseline estimate for the variable concerned.

By 2020, the 90th percentile of the world oil price projections is nearly USD 220 per barrel whereas the 10th percentile is just USD 60 per barrel. Throughout the projection period, we see an increasingly wide distribution of plausible crude oil prices. Regarding the USD/EUR exchange rate, the 90th percentile indicates an appreciation of the euro relative to the US dollar, which reduces EU competitiveness. This leads to a higher level of commodity imports, lower exports from the EU and hence a worsening of the trade balance. However, the 10th percentile indicates a depreciation of the euro relative to the USD, which improves EU competitiveness and allows an improvement in net trade.

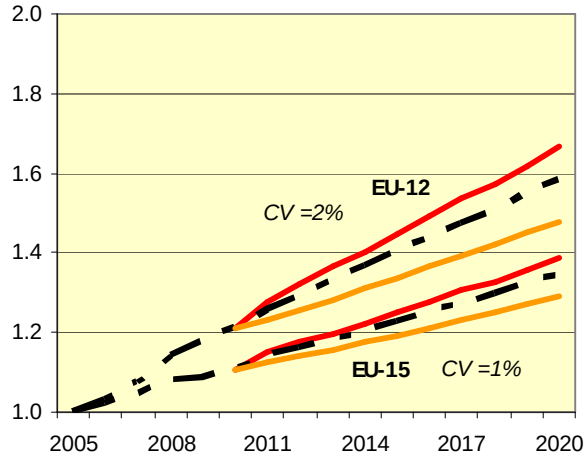
Graph 8.1 Crude Oil price



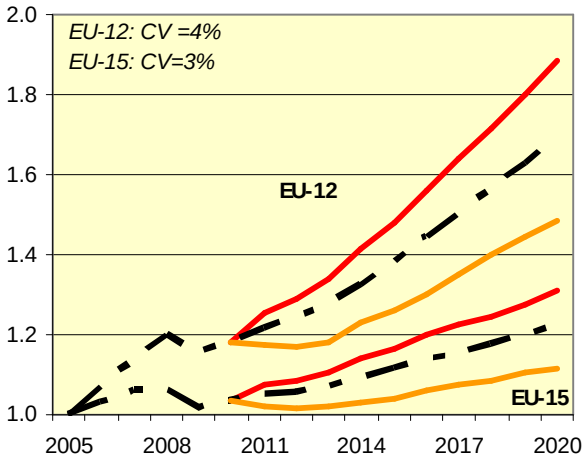
Graph 8.2 USD – Euro Exchange Rate



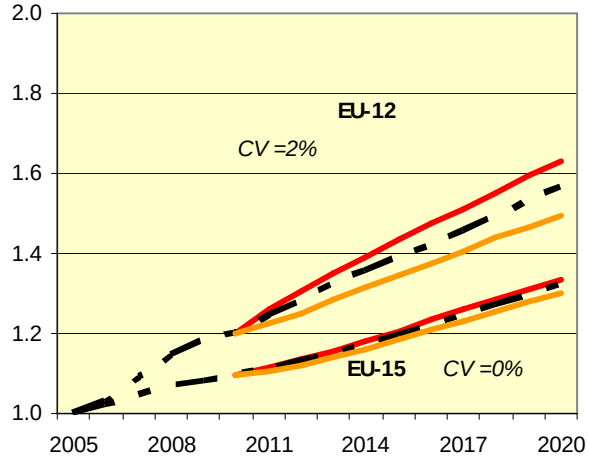
Graph 8.3 EU Consumer Price Index



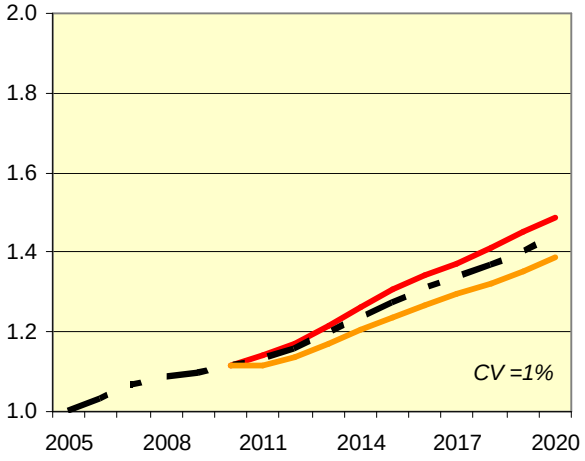
Graph 8.4 EU Real GDP Growth Index



Graph 8.5 EU GDP Deflator



Graph 8.6 USA GDP Deflator



8.2 Results

This section presents the results of incorporating the stochastic macroeconomic assumptions, described above, into simulations of the baseline. In particular, it reports the effects on simulated EU prices and trade.

A key statistic used throughout this section is the average annual coefficient of variation (CV), which measures *variability relative to the mean*. It is defined as the ratio of the average standard deviation of a particular variable (taking values between the 10th and 90th percentiles, i.e. over the 400 'central' values out of the 500 simulation runs) to the average mean of that variable (also calculated from values between the 90th and 10th percentile), from 2011 to 2020. This is an indicator of the extent to which uncertainty in the macroeconomic assumptions translates into uncertainty in the non-stochastic baseline estimate for the variable concerned.

It must be stressed that the stochastic analysis presented in this section does not fully capture all the variability observed in the past. The uncertainty underlying the EU macroeconomic assumptions is indeed not the only uncertainty affecting EU commodity markets.

Almost no consequences of macroeconomic uncertainty for consumption

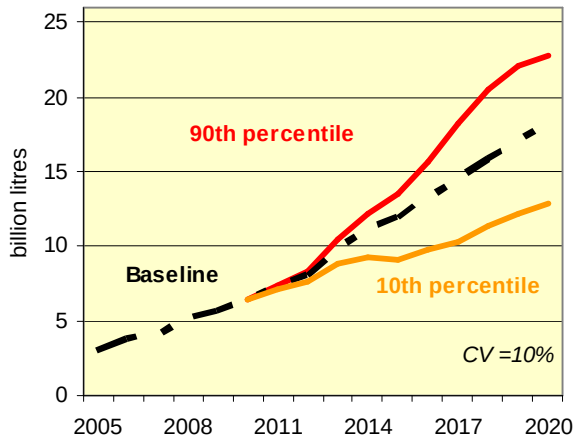
Commodity market outcomes are mostly affected by the high uncertainties related to the exchange rate and the oil price. By contrast, the effect of uncertainty regarding the deflators, the consumer price index and GDP growth is rather limited. There are two reasons for this. First, the uncertainty in these macroeconomic assumptions is smaller, with variability relative to the mean of below 4% (see previous section). Second, these macroeconomic variables mainly affect the demand side of agricultural commodity markets, but as the level of food demand is rather inelastic with respect to price and income *and* depends on other factors as well, the implications of uncertainty regarding these assumptions for the simulations are considerably dampened. Thus, the uncertainty of macroeconomic assumptions affects simulated food use very little. The most sensitive market is that for vegetable oils, where the variability of simulated food use relative to the mean is 2%, whereas for cereals it is 0% and for meats only 1%.

The uncertainty in *total* use that derives from macroeconomic uncertainty is also very small, especially for the products with a small share of use other than human consumption. The commodity whose simulated values are most sensitive to uncertainty is vegetable oils, whose variability is 5% of the mean. This is due to the uncertainty in the use of vegetable oils as a biodiesel feedstock arising from uncertainty in the crude oil price. However, for major commodities like cereals and dairy products, the variability of the simulated values is l% or less relative to their mean.

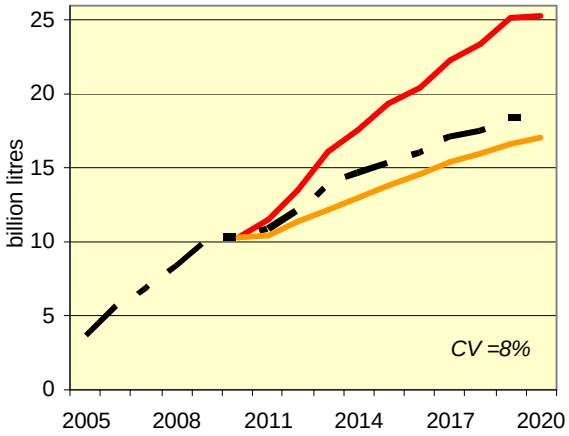
A little effect of uncertainty on primary production, more for biofuel production

Simulated crop production is less affected by the uncertainties underlying the macroeconomic assumptions than by the yield uncertainties (see following chapter). For most commodities, variability in simulated production due to macro uncertainties is less than 1% of the mean. For the most affected products, namely dairy products with a high protein content (SMP and WMP), variability relative to the mean reaches 4%. By contrast, for ethanol and biodiesel production, variability of the simulated values is much higher at 10% and 8%, respectively, of their means (see Graphs 8.7 and 8.8). Indeed, whether the 2020 target of a 10% biofuel share in transport fuel consumption is reached entirely from domestic production or requires substantial imports of biofuels depends on the assumed level of the crude oil price.

Graph 8.7 EU-27 Ethanol production



Graph 8.8 EU-27 Biodiesel production



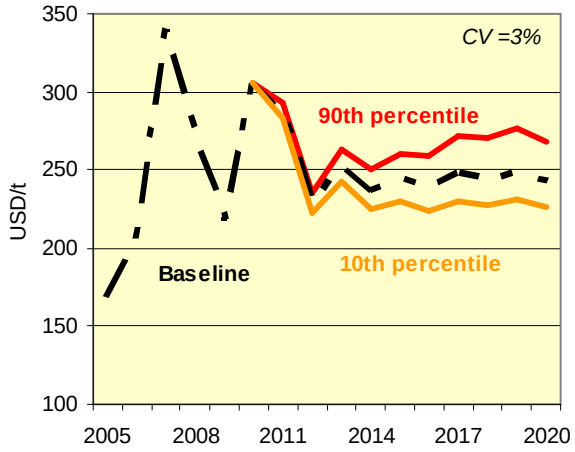
Large implications of exchange rate uncertainty for simulated EU prices

The world price expressed in USD is little affected by the uncertainty on the macroeconomic assumptions analysed in this chapter: the world price variability is only 2% for beef and SMP, 3% for wheat and 4% for butter (see e.g. Graphs 8.9 and 8.11). By contrast, the world price expressed in euro is subject to much more uncertainty and this uncertainty is transmitted to the EU prices. For example, Graphs 8.11, 8.12 and 8.13 show that in 2020 the 10th percentile of the SMP world price in USD/t is only 5% lower than the non-stochastic price whereas in euro it is 28% lower and for the EU price in EUR/t the 10th percentile is below the non-stochastic baseline by 23%. However, it is to be noted that the 10th percentile never goes below the SMP intervention price and this happens for butter only twice during the projection period.

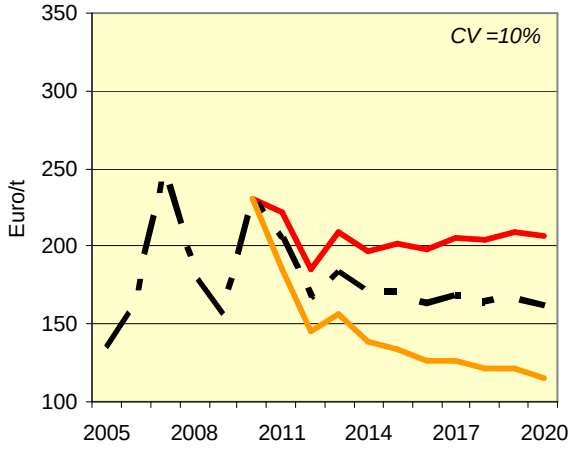
Moreover, the uncertainty regarding the macroeconomic assumptions increases over time, implying that in 2020 the range of possible prices around the non-stochastic baseline is wider than in the first years of the projection period.

The variability in simulated EU crop prices due to the macroeconomic uncertainty is similar for meat and dairy products, at 10% for wheat and 8% for coarse grains. It is virtually fully transmitted to feed costs, which also have a variability of 9% relative to the mean. The variability of the other costs (energy, seeds, fertilisers…) is much smaller (1% for meat and dairy or 4% for maize).

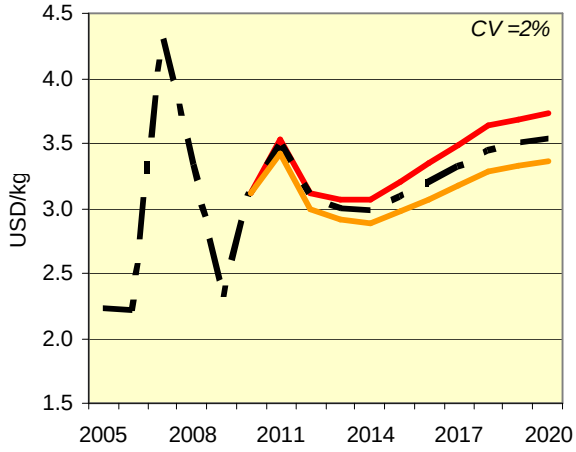
Graph 8.9 Wheat world price in USD/t



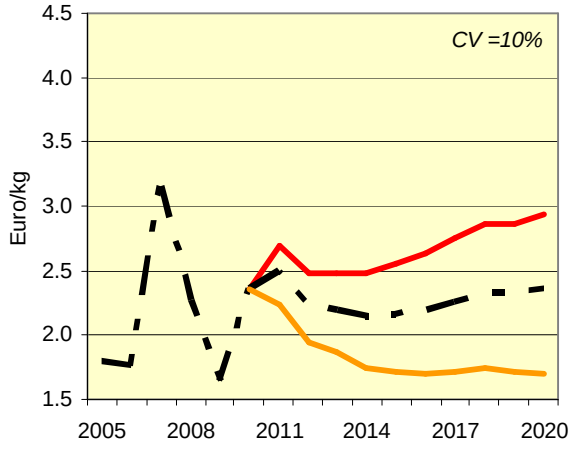
Graph 8.10 Wheat world price in EUR/t



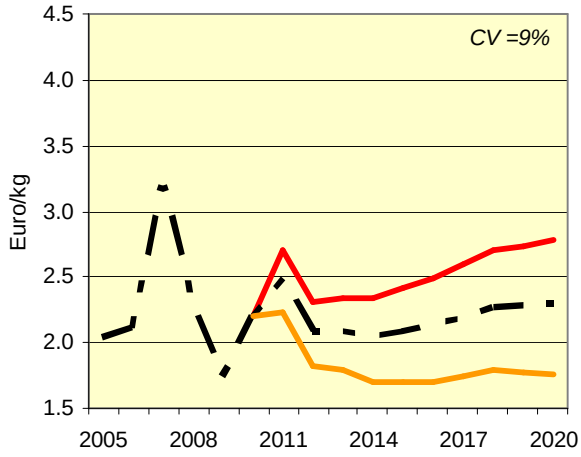
Graph 8.11 SMP world price in USD/kg



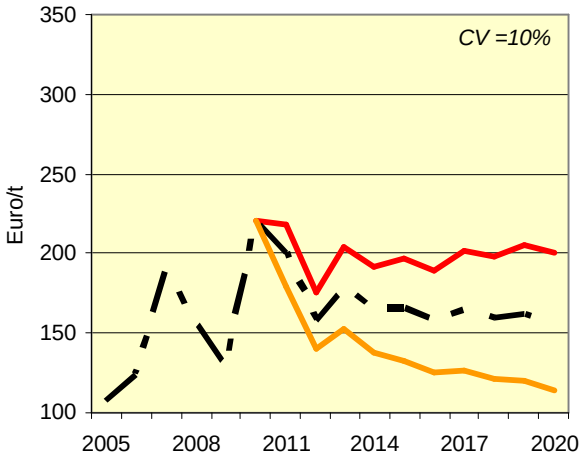
Graph 8.12 SMP world price in EUR/kg



Graph 8.13 EU-27 SMP price in EUR/kg



Graph 8.14 EU-27 wheat price in EUR/t



Trade flows highly sensitive to the macroeconomic assumptions

The exchange rate plays a big role in determining the EU's competitiveness on the world market. As a consequence, the EU trade position could differ markedly from the baseline projections if the macroeconomic environment turns out to be different from the one assumed.

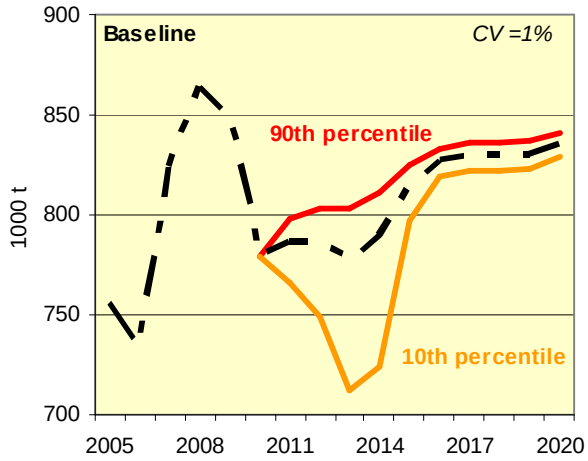
Import variability limited by TRQs

When imports take place exclusively within tariff rate quotas (TRQs), then the 90th percentile of imports is at the TRQ ceiling most of the time and is not very different from the non-stochastic baseline value. However, the 10th percentile varies more (see, for example, poultry and sheep meat, Graphs 8.15 and 8.16). For poultry, the 90th percentile never goes beyond 856 housand tonnes (the TRQ ceiling), whereas in 2013 (when the non-stochastic baseline simulation of imports is 780 thousand tonnes) imports *could* be as low as 710 thousand tonnes (10th percentile). Nevertheless, over the projected period, the variability of EU poultry imports relative to the mean is very small at 1%.

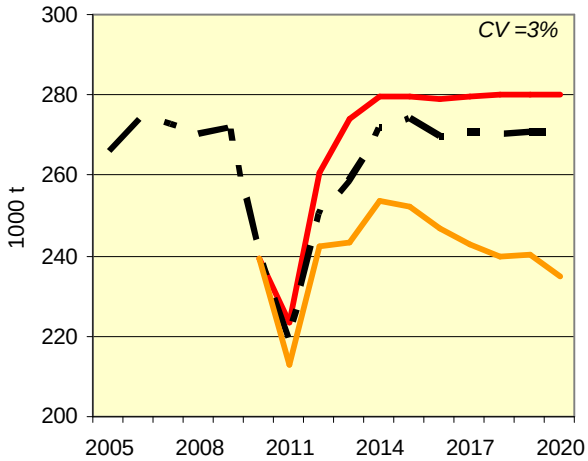
In some of the stochastic simulations, the euro is very strong against the US dollar, but not strong enough to make South American beef competitive on the EU market at the full tariff. As a reminder, the forecast error on the parity of the Brazilian real against the US dollar is not taken into account in these simulations. Therefore, none of the simulations show imports of South American beef outside quota. Nevertheless, the level of EU beef meat imports varies a lot, with a variability of 9% relative to the mean; the 90th percentile of EU beef imports in 2020 is 440 thousand tonnes and the 10th percentile is 270 thousand tonnes (240 thousand tonnes of low beef quality are imported whatever the macroeconomic context).

The uncertainty in simulated exports due to the macroeconomic uncertainty is higher for poultry (CV=12%) than for beef and pork (CVs of 3% and 4%, respectively). In the beef sector, contrary to the non-stochastic baseline, the EU is a net meat exporter from 2018 to 2020 in 20% of the simulations.

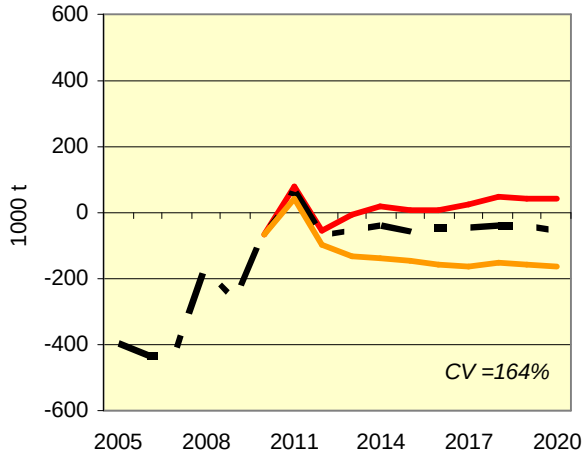
Graph 8.15 EU-27 poultry meat imports



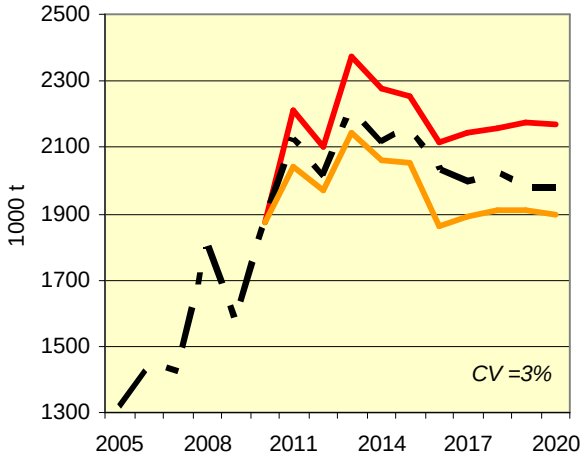
Graph 8.16 EU-27 sheep meat imports



Graph 8.17 EU-27 beef meat net exports



Graph 8.18 EU-27 pork meat exports



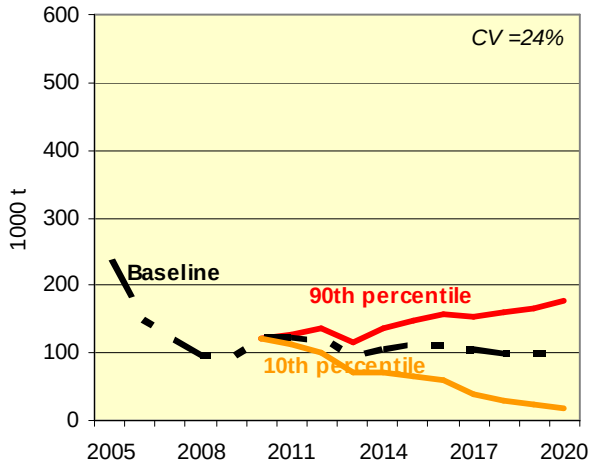
Greater sensitivity of dairy product exports to macroeconomic uncertainty

The dairy sector is more open to the world market than the meat sector because of the significant share of exports in EU dairy production, and shares in world dairy trade varying between 20% and 30% in 2010 depending on the product.

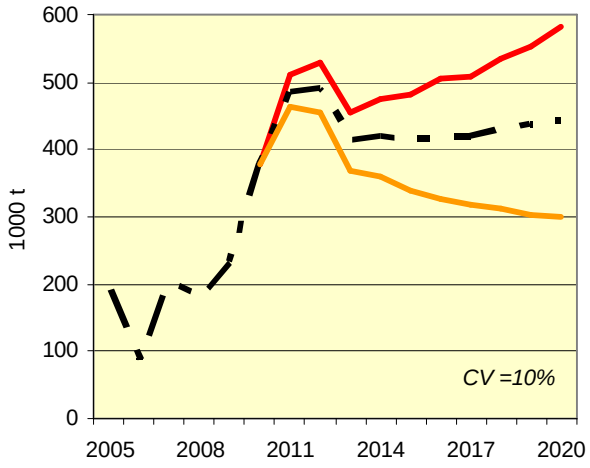
Significant sensitivity of simulated export flows to the uncertainty regarding macroeconomic assumptions is found for butter, SMP and WMP. By 2020, the 10th and 90th percentiles for butter exports are 70 and 200 thousand tonnes, respectively (with variability relative to the mean of 15%), as compared with a non-stochastic baseline value of 130 thousand tonnes. At the same time, 80% of the EU's simulated butter imports lie between 20 and 50 thousand tonnes. Consequently, the variability of net trade in butter relative to the mean is large (at 4%, see Graph 8.19).

The 10th and 90th percentiles of simulated imports in 2020 are 300 and 580 thousand tonnes for SMP (see Graph 8.20), and 310 and 550 thousand tonnes for WMP (see Graph 8.21). For cheese, variability relative to the mean is less but nevertheless the 10th and 90th percentiles of the range of simulated values in 2020 are 550 and 880 thousand tonnes respectively, with a non-stochastic projection of 730 thousand tonnes (see Graph 8.22).

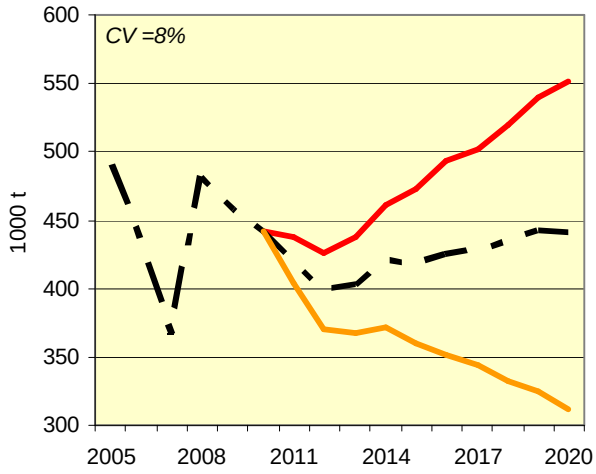
Graph 8.19 EU-27 butter net exports



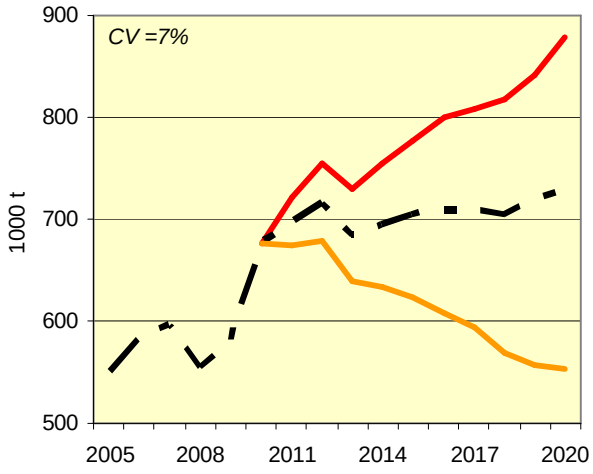
Graph 8.20 EU-27 SMP exports



Graph 8.21 EU-27 WMP exports



Graph 8.22 EU-27 cheese exports



A larger role for uncertainty in the oil price for crops and biofuels

The feed and food components of demand for total cereals are rather inelastic and this tends to dampen the transmission of macro-uncertainty to the total use and production of total cereals. For individual cereals, the variability relative to the mean of the feed component of demand is higher because substitution between grains can occur, but it remains quite small (3% for maize, 2% for wheat and 1% for barley). This means that in 2020 the use of wheat for feed would lie (80% of the time) between 51 million tonnes to 58 million tonnes depending on the macroeconomic context.

However, the industrial component of cereal demand is more sensitive to macroeconomic uncertainty. This shows up most in the variability of crops used as biofuel feedstocks and in net trade. The variability relative to the mean for wheat and coarse grains used for ethanol production is high at 14% and 12%, respectively. For example, the 80% range of wheat use for ethanol production is very small in 2011 (between 4.7 and 4.9 million tonnes) whereas by 2020 the spread around the baseline of 12.6 million tonnes is huge, with the 10th and 90th percentiles recorded as 7.8 and 16.7 million tonnes, respectively.

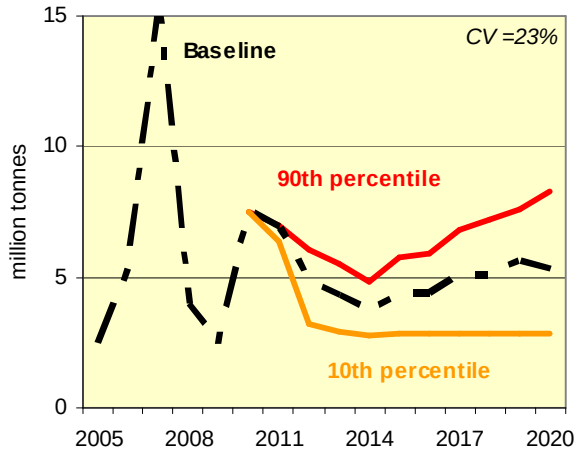
As for trade, the commodity whose imports are most sensitive to the macroeconomic uncertainties is maize, with average variability in imports measured as 23% of the mean. In

2020, the 10th and 90th percentiles of simulated maize imports are 2.8 and 8.3 million tonnes, around a non-stochastic value of 5.3 million tonnes (see Graph 8.23). For wheat and barley (export crops), the variability of exports is lower at 6% and 8% of the mean respectively. In 2020, taking macroeconomic uncertainties into account, 80% of simulated EU wheat exports lie between 14.9 and 20.6 million tonnes (see Graph 8.24).

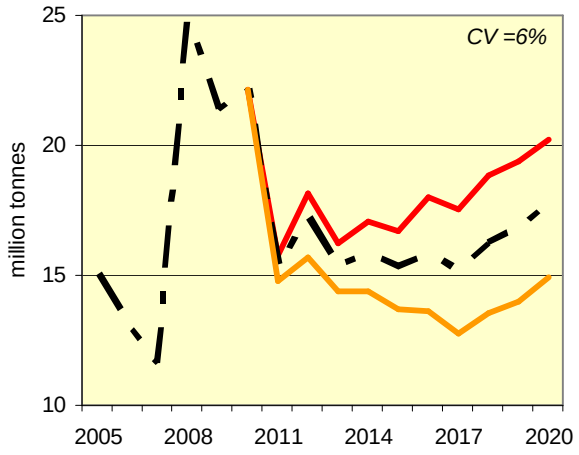
For oilseeds, the uncertainty inherent in the macroeconomic variables is hardly transmitted at all to the imports of oilseeds and oilseed meals, given the feed use inelasticity, but this is not true for vegetable oil imports, whose variability relative to the mean is huge. The 10th percentile of simulated oils imports is rather constant over the projected period and does not go below 2.5 million tonnes. But the 90th percentile increases from 3.2 million tonnes in 2011 to 7.6 million tonnes in 2020, whereas in the non-stochastic baseline imports increase from 2.9 to 3.3 million tonnes over the same period (see Graph 8.25).

The uncertainty in macroeconomic assumptions implies that the incentive to *produce* biofuels domestically can vary widely, as explained at the beginning of this chapter. However, the *use* of biofuels in the EU is fixed by the renewable energy target, and the variable of adjustment is net trade whose sensitivity to the macroeconomic uncertainties is very great. In 2020, the 80% range for ethanol net imports lies between 11 billion litres and almost zero, the non-stochastic baseline projection being 6.1 billion litres (see Graph 8.26). For biodiesel, from 2013 the EU is a net exporter in 20% of the simulations. In 2020 the simulated net exports could reach 3.7 billion litres (90th percentile) but in the same year the EU *could* be a net importer of 5.4 billion litres (10th percentile).

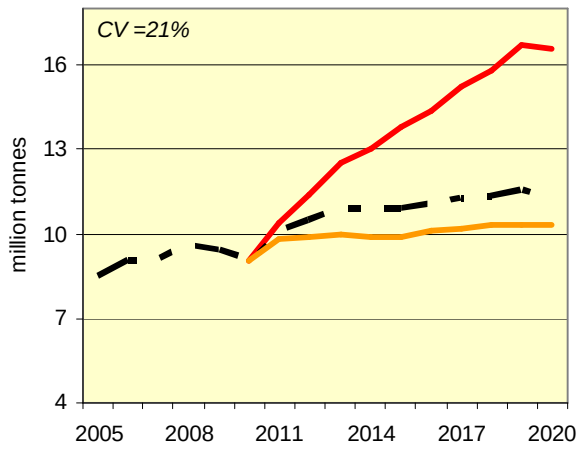
Graph 8.23 EU-27 maize imports



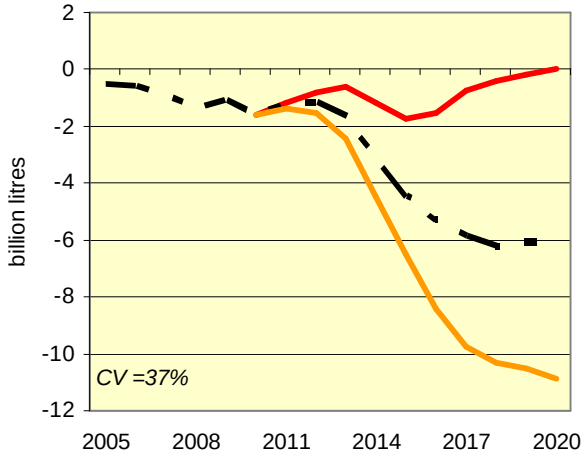
Graph 8.24 EU-27 soft wheat exports



Graph 8.25 EU-27 vegetable oils imports



Graph 8.26 EU-27 ethanol net exports



9 Uncertainties in EU Arable Crop Yields

Price volatility in food and agricultural markets has been a topic of much discussion in recent times. Part of the crop price variation observed in the past can be explained by changes in supply due to crop yield variation caused by fluctuations in the weather pattern. Partial stochastic simulation attempts to capture the contribution of crop yield uncertainty to these price uncertainties. The simulations presented here were carried out using the IPTS/DG-AGRI partial stochastic version of DG-AGRI's update 2011 AGLINK-COSIMO model (used in Part I of this report). The detailed methodology for performing simulations of arable crop yields to capture the effect of weather patterns will be presented in a JRC Scientific and Technical report to be published in 2012.

9.1 Scenario settings

Following FAPRI (2006)[14] and Strauss *et al.* (2010)[15], the OECD-FAO standard AGLINK-COSIMO model has been adapted to enable partial stochastic simulations of soft wheat, durum wheat, barley, maize, other cereals, oats, rye, soya bean sunflower, and rapeseed yields in EU-15 and EU-12. The yields presented in Part I are a function of EU arable crop prices, individual commodity price cost index and a time trend. The stochastic yield equations include an additional variable to reflect fluctuations between the modelled yield (corresponding to the expected yield in normal weather conditions) and the observed yield, this variable measures the yield forecast error. It is assumed that the forecast errors of the different crops follow a joint normal distribution and the historical correlations between crops within and between EU-15 and EU-12 are maintained. Furthermore, stochastic fluctuations are assumed to be independent between years and are not correlated with other arable crop producing countries. Five hundred sets of stochastic yields were generated for each year between 2011 and 2020, in order to represent the range of 'plausible' yields given the variability observed in the past. A new solution set is generated at the end of each simulation.

The average annual coefficient of variation indicates the extent to which uncertainty in the arable crop yields translates into uncertainty in the non-stochastic baseline estimate for the variable concerned. The reported annual coefficient of variation should not be compared with the historic annual fluctuations. The graphs reported in this section of the report combine the 10^{th} and 90^{th} percentiles with the non-stochastic baseline, presented in Part I of this report. In most cases, the 10^{th} and 90^{th} percentiles will evolve in a similar way as the non-stochastic baseline. However, in some cases the introduction of stochastic yields will lead to asymmetric simulation solutions between the 10^{th} and 90^{th} percentiles because of a regime-switching mechanism (e.g. moving between non-binding and binding biofuel mandates and tariff rate quotas).

9.2 Results

This section presents the results of the stochastic arable crop yield simulations of the baseline. In particular, it reports how yield uncertainty imparts uncertainty to EU producer prices, world prices, EU net trade and cost of feed.

14 FAPRI (2006). FAPRI 2006 U.S. Stochastic Baseline: A View of 500 Alternative Futures. Working Paper #05-06, Food and Agricultural Policy Research institute (FAPRI), Missouri.

15 Strauss, P.G. and F. H. Meyer (2010). Combining Stochastic Modeling Techniques with Scenario Thinking for Strategic and Policy Decisions in Agriculture. Journal of International Agriculture Trade and Development 6 (1): 61-81.

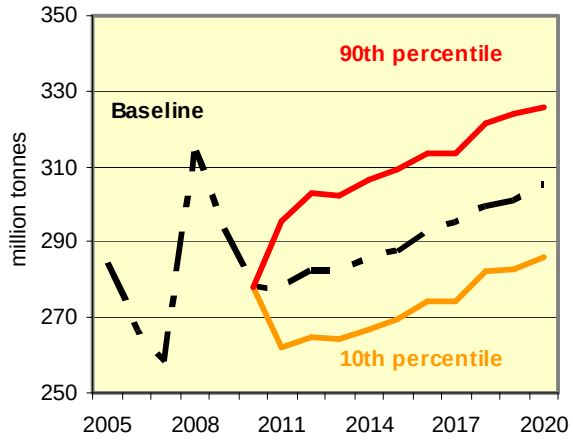
Total agricultural land use little affected but more uncertainty in individual crop areas because of substitution between arable crops

Abnormal weather patterns can have an impact on crop and meat production. By 2020, the application of partial stochastic crop yields shows that 80% of the simulated total EU cereal production are between 19 million tonnes below the baseline and 21 million tonnes above the baseline (10^{th} and 90^{th} percentiles, respectively), or 7% below and 6% above the baseline, respectively (see Graph 9.1). As for individual crops, the simulations show that the production of wheat and of barley (with an average annual coefficient of variation) have about half the level of uncertainty that characterises maize, rye, oats, other cereals and oilseeds output. The relative competitiveness of specific crop activities depends on the initial relationships between yields, prices, and costs.

The effect of uncertain arable crop yields on projected total EU meat production is negligible at best. The simulations show that the 10^{th} and 90^{th} percentiles in 2020 lie just 1% below and 1% above the non-stochastic baseline, respectively. An explanation is given below. Graphs 9.3 to 9.10 report uncertainty in EU agricultural production due to uncertainty in arable crop yields for individual commodities.

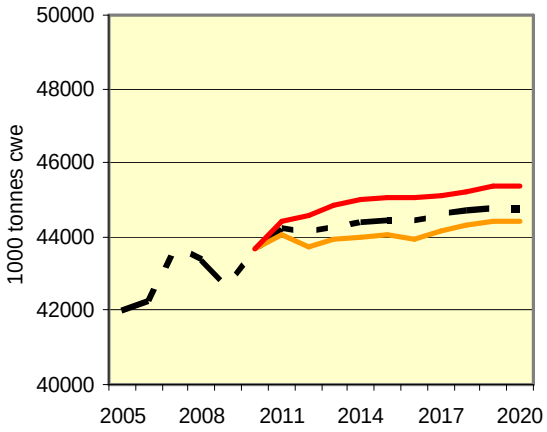
Graphs 9.1 to 9.10: Uncertainty in EU agricultural production due to uncertainty in arable crop yields

Graph 9.1 Total cereals production



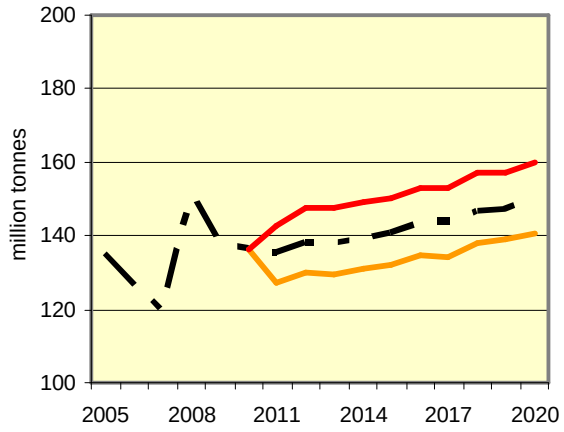
Coefficient of variation(CV)= 3%

Graph 9.2 Total meats production



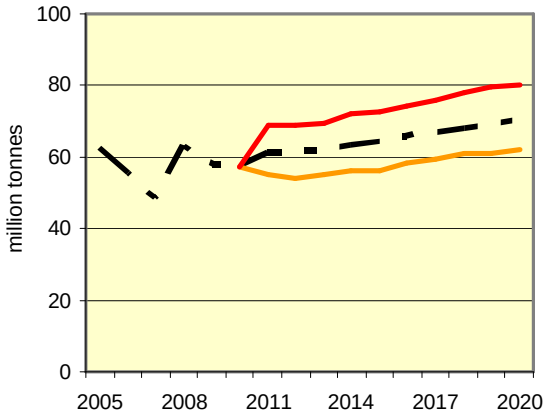
CV = 1%

Graph 9.3 Wheat production



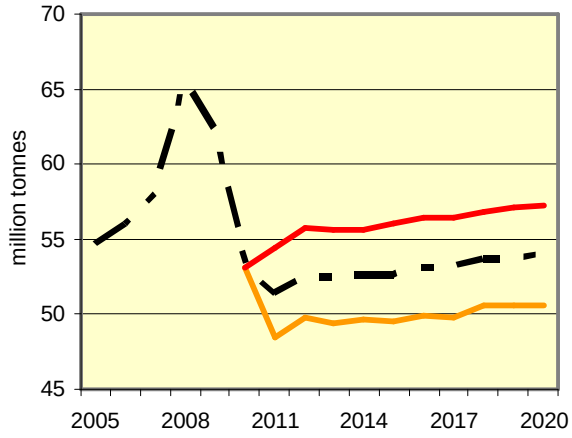
CV = 3%

Graph 9.4 Maize production



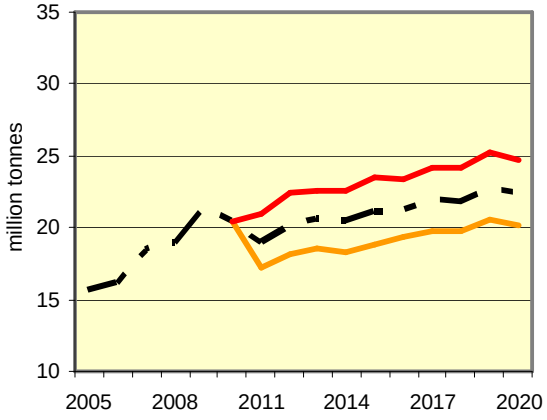
CV= 7%

Graph 9.5 Barley production



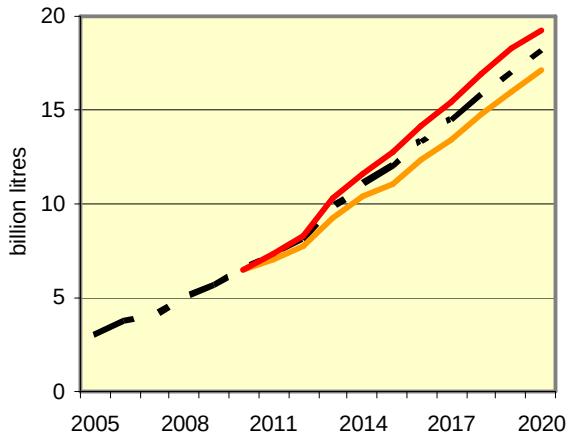
CV=3%

Graph 9.6 Rapeseed production



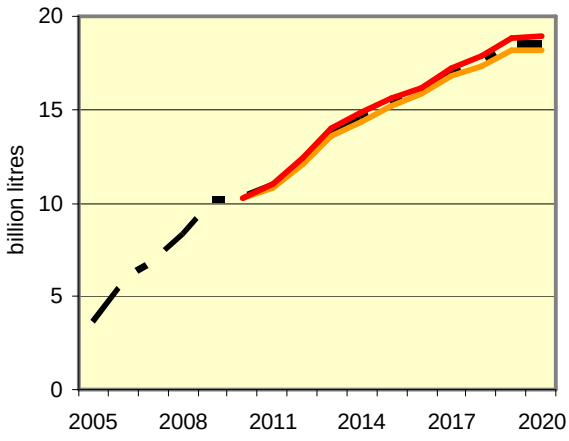
CV= 5%

Graph 9.7 Ethanol production



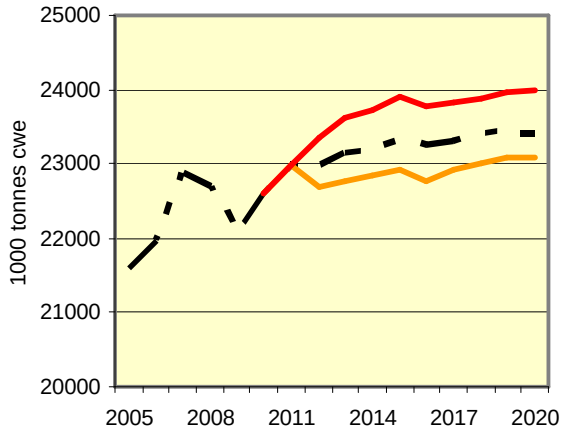
CV= 3%

Graph 9.8 Biodiesel production



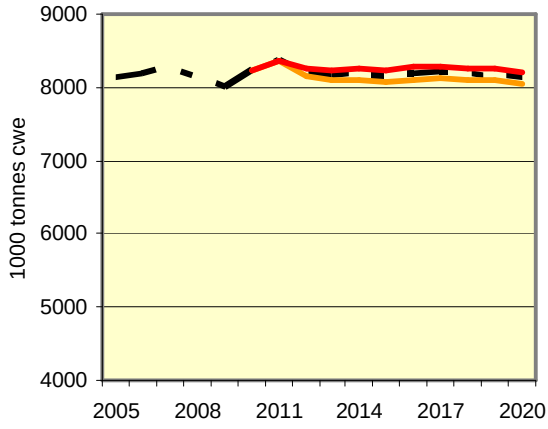
CV= 1%

Graph 9.9 Pork production



CV= 1%

Graph 9.10 Beef and veal production



CV= 0%

Significant uncertainty in EU price projections but less in projected world market prices

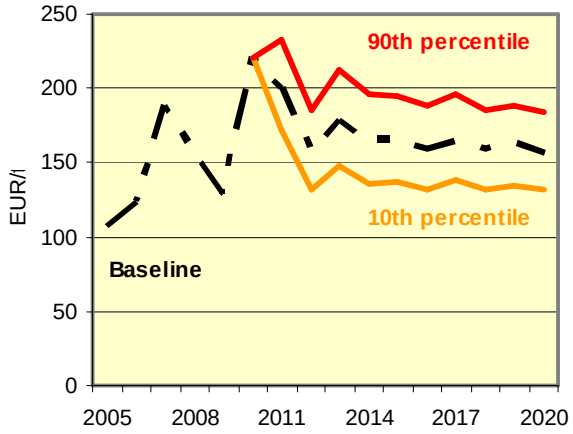
Any impact of arable crop yield uncertainty is transmitted to producer prices for these crops. This uncertainty translates to different extents across the balance sheet for EU agricultural commodities. Food and feed demand for total cereals are relatively unresponsive to changes in total production. Although biofuel use is more responsive to production shocks than food and feed use, the uncertainty characterising total consumption response is rather small. [16] Consequently, with relatively inelastic consumption, variability in production is transmitted to net trade via changes in relative prices.

Graphs 9.11 to 9.18 report domestic producer price in euros for different commodities. The variability relative to their respective mean of the main arable crop prices (between 10% (wheat) and 11% (maize and barley)) is higher than for other products like SMP (3%) and pork (4%) as livestock products are affected only indirectly by the changes in yields via feed costs (refer below). Biodiesel prices are affected by uncertainties in arable crop yields. Maize has the highest simulated variability relative to its mean, largely because US maize ethanol production is projected to be above its mandate in every year of the projection horizon. A large proportion of maize production is used in US maize ethanol production, which is more sensitive to price changes. Consequently, the demand for maize is more inelastic relative to other arable crops. A further consequence of high maize price uncertainty is uncertainty in EU meat prices (variability of 2% (poultry), 4% (pork) and 3% (beef and veal)). This is because of the significant share of maize used for animal feed to fatten these livestock.

16 Total consumption is defined as food-use, feed-use, biofuels and other use.

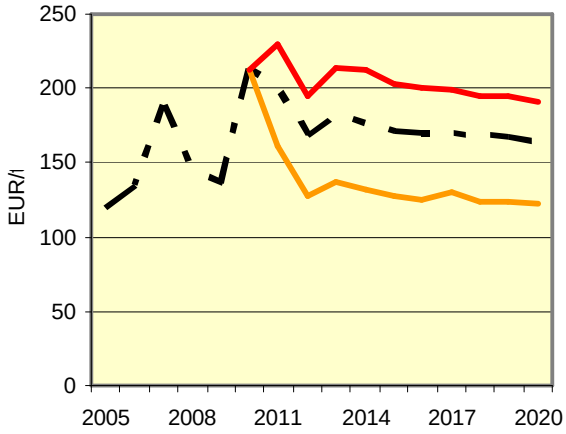
Graph 9.11 to 9.18: Uncertainty in EU producer prices due to uncertainty in arable crop yields

Graph 9.11 Wheat price



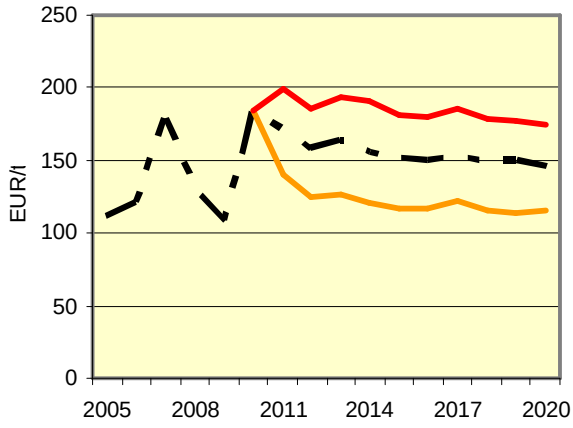
CV= 10%

Graph 9.12 Maize price



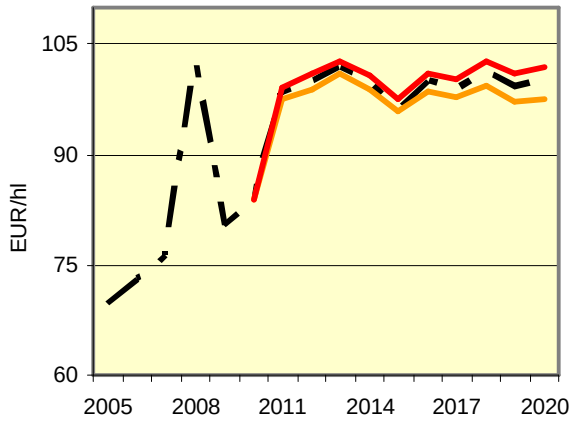
CV= 11%

Graph 9.13 Barley price



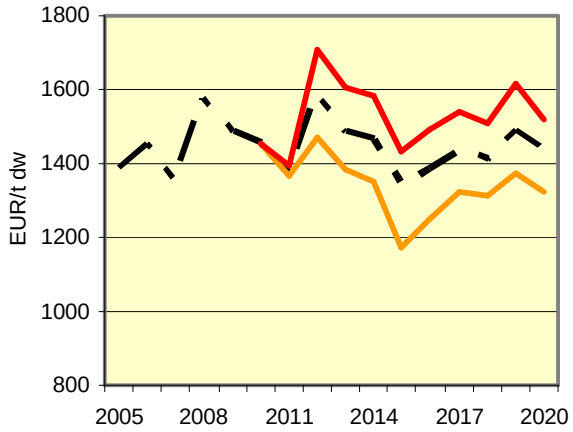
CV= 11%

Graph 9.14 Biodiesel price



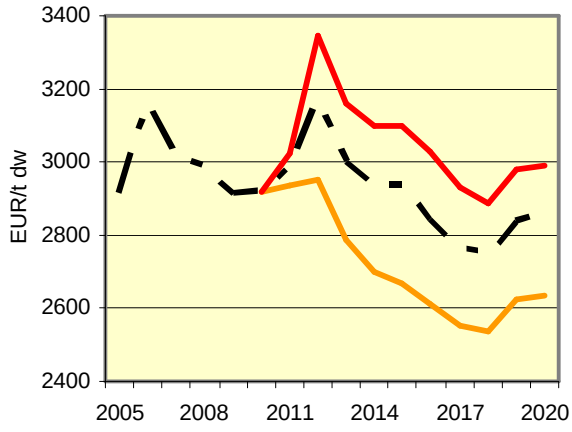
CV= 0%

Graph 9.15 Pork price



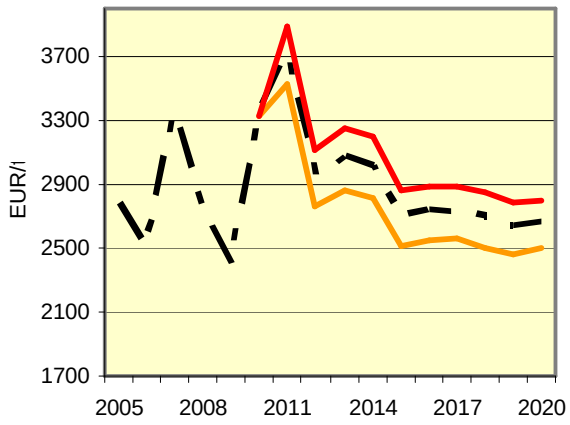
CV = 4%

Graph 9.16 Beef and veal price



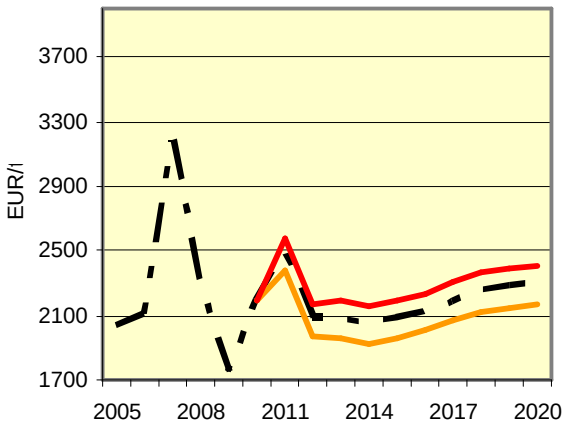
CV = 3%

Graph 9.17 Butter price



CV= 3%

Graph 9.18 SMP price

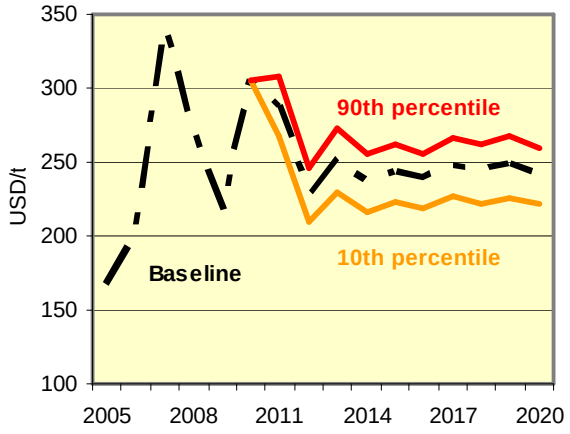


CV= 3%

Differentials between changes in world and EU prices are consistent with the level of integration of the EU agricultural markets with the world markets. The extent to which uncertainty in EU arable crop yields leads to uncertainty in world prices is reported in Graphs 9.19 to 9.24. The implied uncertainty for world markets is smaller for arable crops relative to the EU. However, the implied uncertainty for pork prices at the EU level (4%) is almost fully transmitted to world prices (3%). For beef and veal, EU prices are marginally transmitted to world prices (1%). The difference between transmission rates is due to the regional segmentation of the meat market.

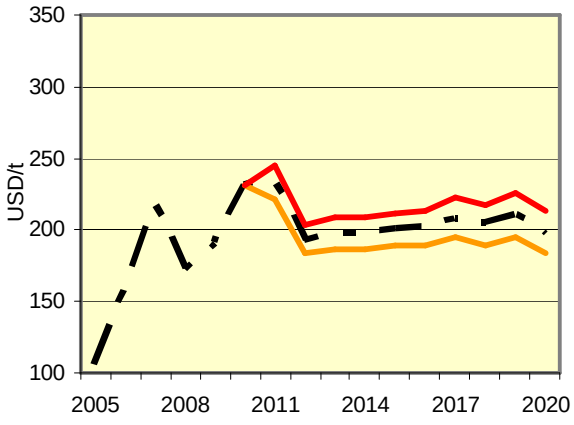
Graphs 9.19 to 9.24: Uncertainty in world market prices due to uncertainty in arable crop yields

Graph 9.19 World wheat price



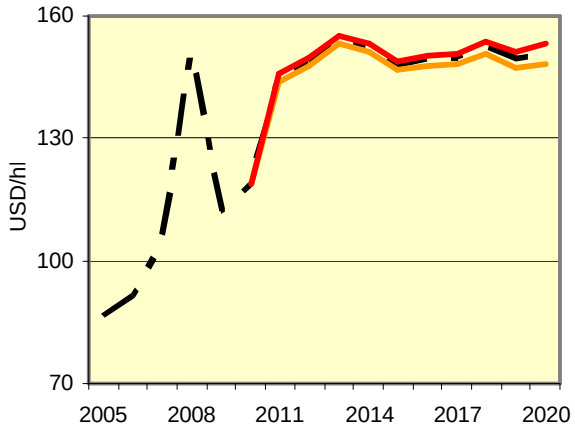
CV= 4%

Graph 9.20 World coarse grains price



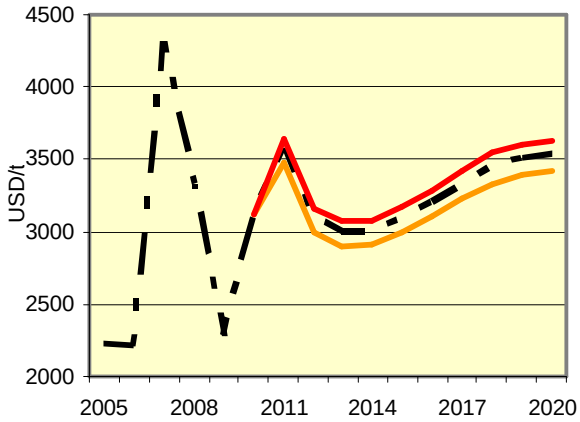
CV= 3%

Graph 9.21 World biodiesel price



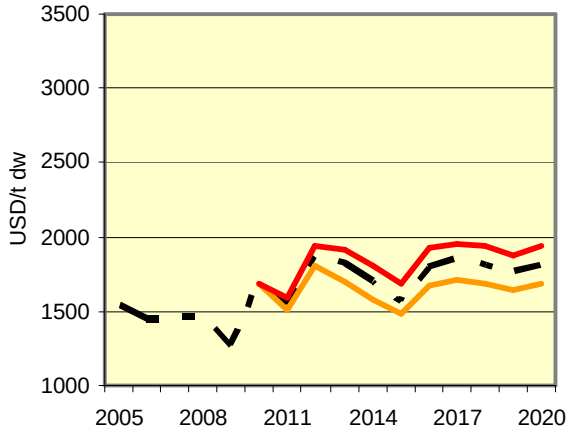
CV= 0%

Graph 9.22 World SMP price



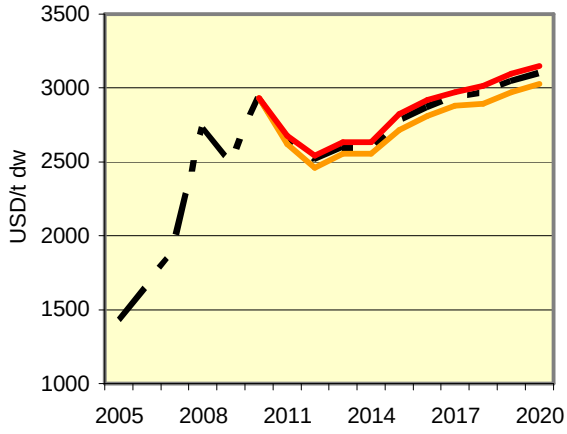
CV= 1%

Graph 9.23 World pork price



CV= 3%

Graph 9.24 World beef and veal price

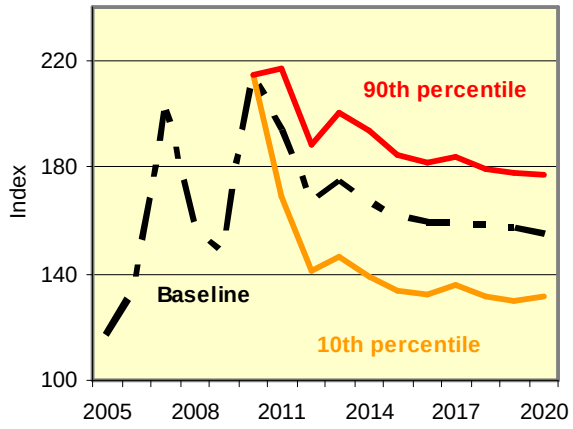


CV= 1%

Significant implications of yield uncertainty for projections of animal feed costs

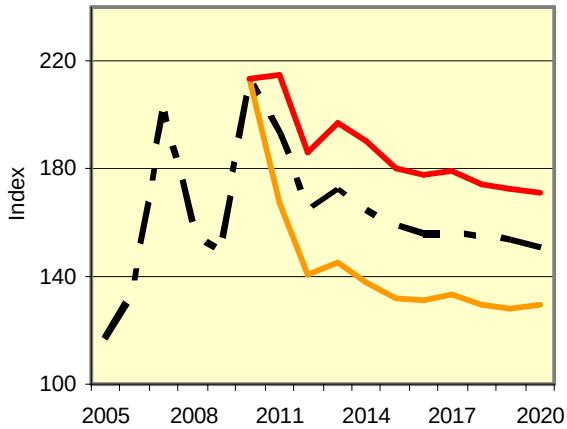
The implications of EU arable crop yield uncertainty for the baseline in the livestock sector are transmitted via feed costs. Graphs 9.25 and 9.26 report the cost of feed for non-ruminants (pigs and poultry) and ruminants (cattle and sheep). Relative to the non-stochastic baseline, stochastic arable crop yields impart a large degree of uncertainty to the feed cost indices for both non-ruminant and ruminant livestock, each having variability relative to its mean of 8%. The effect of arable crop yield uncertainty on projected livestock production is negligible (variability of 1% and 0% for pork and beef and veal, respectively, see Graphs 9.9 and 9.10) because the demand for animal feed is relatively inelastic, due to supply lags and multi-period herd dynamics. In the case of ruminants, meat production depends on animals already in production when the feed cost changes; consequently, meat production is not affected in the short term. Furthermore, if the variation is symmetric around a trend from year to year, then most of the fluctuations should be absorbed in short-term profits. The same applies for non-ruminants (pork, poultry and egg) but one could envisage additional flexibility due to reduced time lags and breeding dynamics.

Graph 9.25 Non-ruminant feed cost index



CV= 8%

Graph 9.26 Ruminant feed cost index



CV= 8%

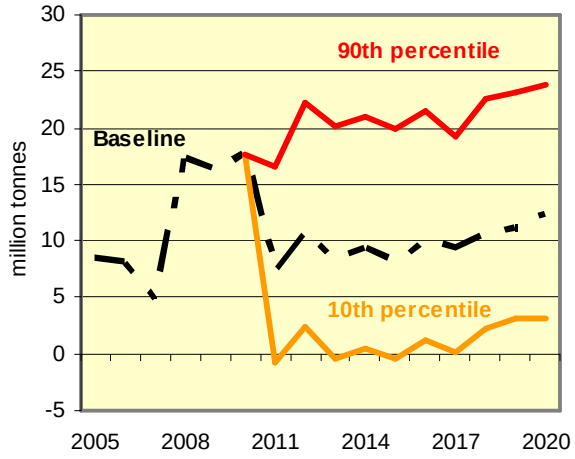
Trade projections are significantly affected

With almost no variation in food use, limited yield-induced variability in total feed use (1%) and some substitution between feed arable crops, we find that variability in supply translates into substantial variability in net trade. Graphs 9.27 to 9.36 report the consequences of yield uncertainties for the degree of uncertainty in the net trade position of key agricultural commodities. In nearly all cases, the implications of stochastic arable crop yields do not include a positive probability that the net trade status of the EU changes (i.e. a shift from being a net exporter to net importer, or vice versa). However, for wheat there is a small probability at the 10th percentile of shifting from being a net exporter to net importer for up to four of the ten projection years. This means that in up to four years out of ten, there is a probability of at least 10% that the EU has net importer status. EU beef and veal maintains a net importer position for meat throughout the projection horizon in the non-stochastic baseline. However, from 2013, 10% of simulations show a net exporter position.

In order to model the 2020 target for renewable energy use in the transport sector, the ethanol and biodiesel consumption in 2020 are fixed on the basis of separate exogenous estimates of petrol and diesel consumption by the transport sector in 2020. This forces the simulations to satisfy these targets in both the non-stochastic and the stochastic simulations. Hence, EU consumption of ethanol and biodiesel, and their feedstocks, remain high in all simulations. Nevertheless, uncertainty in the crude oil price influences the projected demand for feedstocks for EU biofuel production.

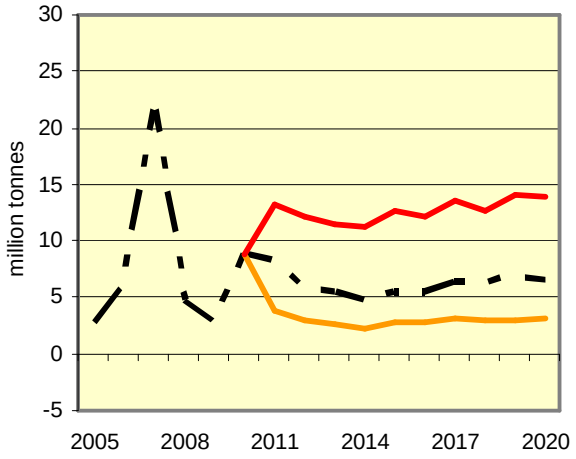
Graph 9.27 to 9.36: Uncertainty in EU net trade due to uncertainty in arable crop yields

Graph 9.27 Wheat net trade



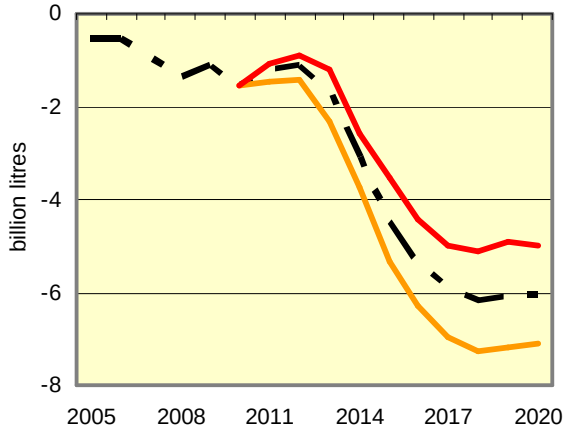
CV= 51%

Graph 9.28 Coarse grains net trade



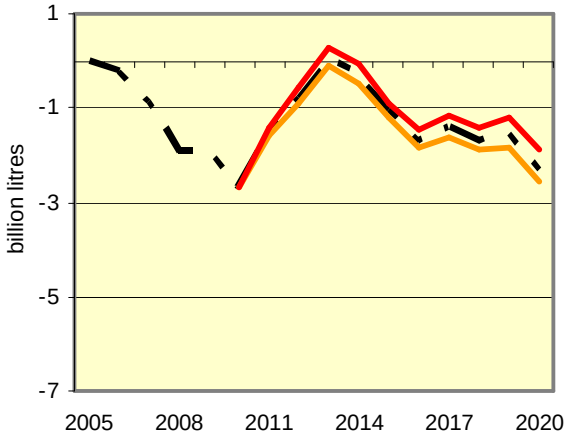
CV= 490%

Graph 9.29 Ethanol net trade



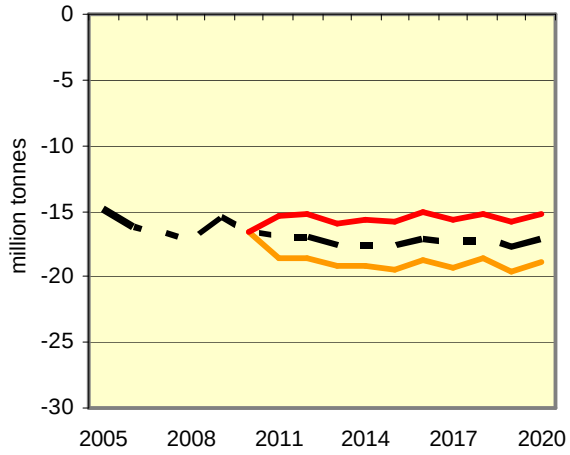
CV= 10%

Graph 9.30 Biodiesel net trade



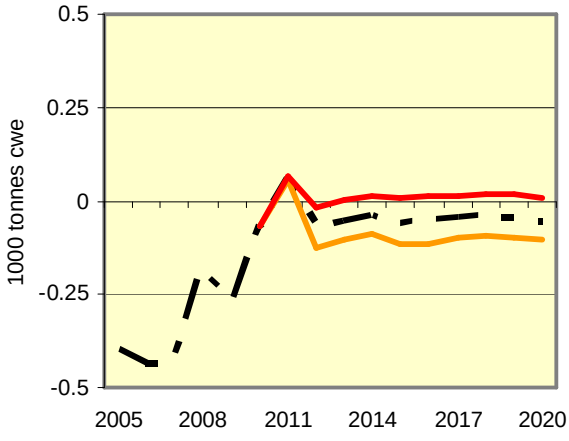
CV= 3%

Graph 9.31 Oilseeds net trade



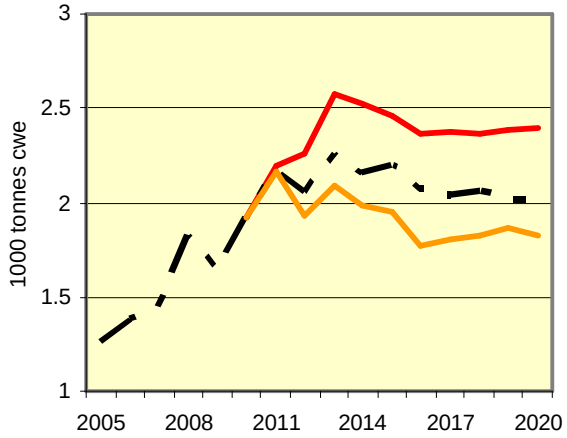
CV= 5%

Graph 9.32 Beef (meat) net trade



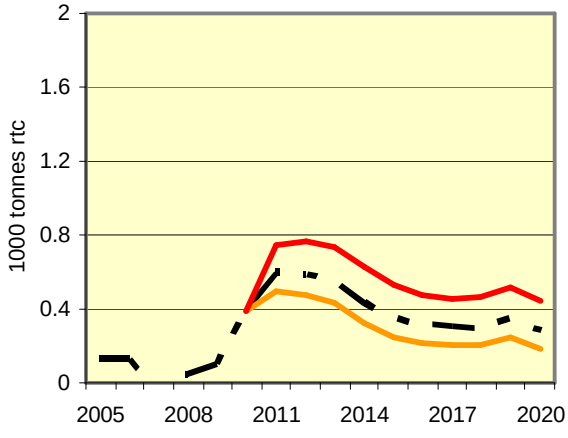
CV= 60%

Graph 9.33 Pork net trade



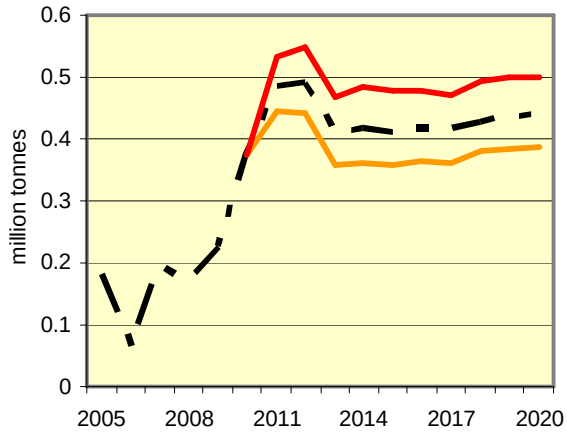
CV= 6%

Graph 9.34 Poultry net trade



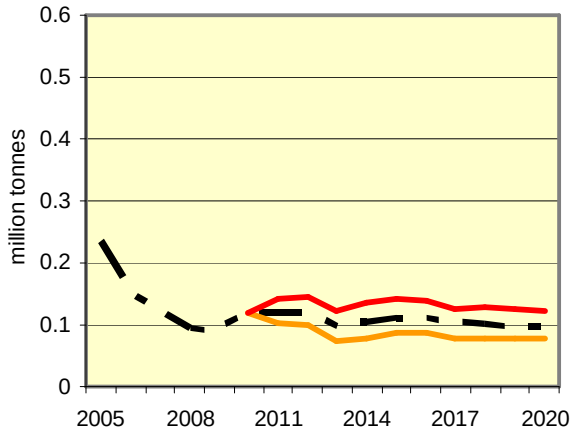
CV = 18%

Graph 9.35 SMP net trade



CV= 7%

Graph 9.36 Butter net trade



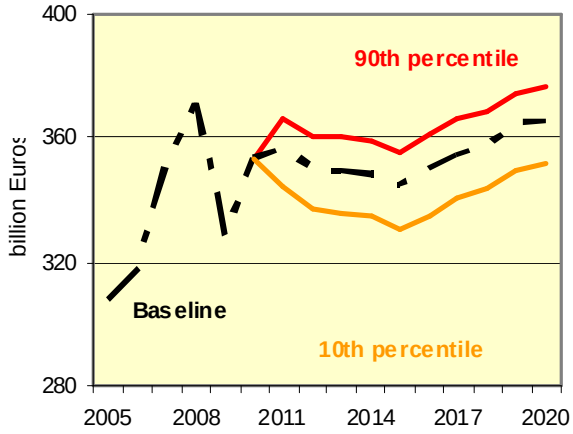
CV = 12%

Prospects for EU agricultural output little affected by yield uncertainty

The implications of yield uncertainty for uncertainty in projected EU agricultural output and the real factor income are reported in Graphs 9.37 and 9.38. Graph 9.37 shows symmetric developments at the 10th and 90th percentiles relative to the baseline over the projection horizon. However, the simulations show that 10th and 90th percentiles in 2020 lie 4% below and 3% above the non-stochastic baseline, respectively. Graph 3.38 shows asymmetric developments at the 10th and 90th percentiles relative to the baseline over the projection horizon. The simulations show that 10th and 90th percentiles in 2020 lie 13% below and 5% above the non-stochastic baseline, respectively.

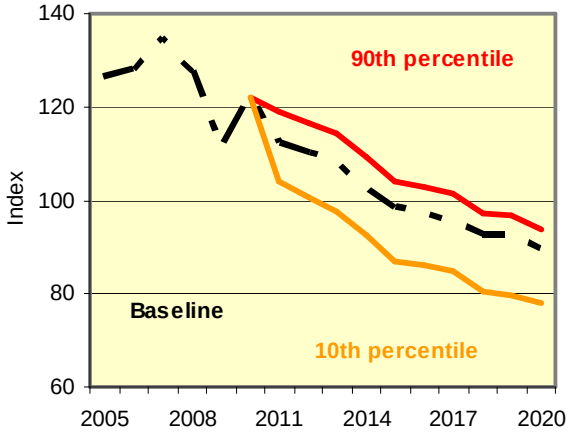
The reported average annual variability of EU agricultural output relative to its mean is 2%. The reader is reminded that the prospects for agricultural sectors not covered by the modelling tools used for the baseline projections, the assumptions on the rate of fixed capital consumption, the level of subsidies and the pace of future structural change may be different from what has been assumed. These elements have far reaching implications on the prospects for agricultural income, in addition to the general uncertainties surrounding the current medium term projections described in Part I of this report.

Graph 9.37 EU Agricultural output



CV = 2%

Graph 9.38 EU Agricultural real factor income*



CV = 4%
**The reader should note that EU agricultural real factor income reported in graphs 5.1 and 9.38 are differently indexed*

10 Comparison of the consequences of macroeconomic and yield uncertainty

The following chapter presents a comparison of the consequences of the macroeconomic and yield uncertainty.

Table 10.1 Average uncertainty of the 2011-2020 projections of area, production and use due to uncertainty in macroeconomic and yield assumptions (variability as % of mean)

	Area		Production		Total use		Food use		Feed use		Biofuel use	
	Macro	Yields	Macro	Yields	Macro	Yields	Macro	Yields	Macro	Yields	Macro	Yields
Cereals	0.5	0.7	0.8	3.4	1.1	0.4	0.3	0.3	1.7	0.9	12.8	5.1
Wheat	0.8	0.8	1.2	3.3	1.3	1.2	0.3	0.3	2.3	3.3	13.6	5.7
Coarse grain	0.2	0.7	0.5	4.0	1.0	0.9	0.3	1.0	1.6	0.7	12.4	5.1
Barley	0.3	0.7	0.6	3.1	0.4	2.2						
Maize	0.4	1.3	0.6	6.5	1.7	2.4						
Oilseeds	0.6	0.4	1.0	4.4	0.7	1.0	0.3	0.2				
Protein meals			0.6	0.8	0.5	0.8	0.0	0.0	0.5	0.8		
Vegetable oils			0.9	1.2	5.2	0.6	1.9	0.3			9.6	0.9
Ethanol			9.9	3.0	7.2	0.1						
Biodiesel			8.3	0.8	4.4	0.0						
Meats			0.6	0.5	0.6	0.1	0.6	0.1				
Beef and veal			1.1	0.4	0.7	0.2	0.7	0.2				
Sheep			0.7	0.1	0.4	0.2	0.4	0.2				
Pork			0.4	0.9	0.5	0.4	0.5	0.4				
Poultry			1.2	0.9	0.9	0.4	0.9	0.4				
Milk	1.0	0.5										
Butter			1.3	0.9	0.3	0.3	0.3	0.3				
Cheese			1.1	0.3	0.9	0.1	0.9	0.1				
SMP			4.0	3.0	0.4	0.3	0.3	0.1	0.6	0.5		
WMP			4.2	2.9	0.5	0.1	0.5	0.1				

Note: The figures in the table are the average annual coefficient of variation of the baseline projections for the period 2011-2020, calculated over the 80% central values in the stochastic simulations (see chapter two for more explanation).

Area: transmission of the uncertainty from the two sources (macroeconomic assumptions and arable crop yield assumptions) to the 2011-2020 baseline projections is roughly comparable, except that the uncertainty in coarse grain area due to yield uncertainty is much greater than that due to macroeconomic uncertainty.

Production: Arable crop production is much more sensitive to yield uncertainty than to macroeconomic uncertainty given that yield determines production. The opposite is true for biofuel production, where the transmission of macroeconomic uncertainty (which includes uncertainty about the crude oil price and the USD/EUR exchange rate) to projected production is much greater than that of yield uncertainty since the incentive to produce biofuels depends strongly on the crude oil price. Finally, in the livestock sector (meats and dairy products), the projected production of these variables is slightly more sensitive to macro uncertainty than to yield uncertainty.

Use: Baseline projections of the three components of total use (food, feed and biofuels) are affected to different extents by the two types of uncertainty. The most uncertain baseline results are those for cereal use for biofuels, and they are considerably more sensitive to the uncertainty underlying the macroeconomic assumptions than to yield uncertainty. Less of both types of uncertainty is transmitted to food use than to feed use, because food demand is

very price-inelastic. As for total use, the uncertainty in biofuel use stands out as being much greater than that of any of the other commodities but only in so far as macroeconomic uncertainty is concerned. Apart from biofuels, no dominant pattern emerges for the baseline results relating to total use. However, two points are worth making. First, total use of livestock products tends to be somewhat less sensitive than total use of crop products to both sources of uncertainty. Second, in general, the uncertainty surrounding assumptions about crop yields tends to matter less for the baseline projections of total use than the uncertainty characterising macroeconomic conditions. However, this is not true for individual products, which are partly substituted for each other in the total.

The uncertainty in production *and* use suggests that the implications of this uncertainty for net trade (which is the difference between these two aggregates net of stock changes) will be much greater than the uncertainty in either of them, considered separately. This is documented in Table 10.2.

Table 10.2 Average uncertainty of the 2011-2020 projections of trade flows, stocks and prices due to uncertainty in macroeconomic and yield assumptions (variability as % of mean)

	Exports		Imports		Net trade		Stocks		Producer price		World price in USD	
	Macro	Yields	Macro	Yields	Macro	Yields	Macro	Yields	Macro	Yields	Macro	Yields
Cereals	5.6	23.4	13.8	30.7	16.5	105.4	1.1	3.1				
Wheat	5.9	22.8	7.0	22.0	11.0	51.3	1.7	3.9	10.1	8.9	3.2	4.1
Coarse grain	8.1	27.0	23.1	41.4	46.0*	490.4*	0.8	2.8	7.6	11.0	3.2	3.2
Barley	7.3	25.6	1.7	8.3			0.9	2.7	8.2	10.9	3.0	3.1
Maize	10.5	28.3	23.0	42.4			0.8	3.1	7.3	11.2	0.0	0.0
Oilseeds	9.8	18.4	2.3	4.5	2.7*	5.2*	0.4	1.1	9.2	5.7	2.8	3.2
Protein meals	3.2	4.0	1.5	2.1			1.2	0.8	10.5	3.8	1.6	2.7
Vegetable oils	6.2	0.6	21.2	2.7			1.2	0.4	11.0	1.5	5.1	1.2
Ethanol					37.0*	10.3*			11.7	0.9	17.8	0.1
Biodiesel					109.8*	2.6*			10.5	0.7	11.4	0.5
Meats	4.3	4.2	3.3	1.8	8.9	7.7	0.4	0.0				
Beef and veal	3.8	2.4	9.2	5.8	164.1	60.3	1.1	0.7	7.8	3.2	2.3	0.9
Sheep	1.6	0.3	3.1	1.0	3.6*	1.2*			7.9	1.1	2.1	0.9
Pork	2.8	5.9	5.4	2.7	2.8	6.0			6.5	3.7	2.9	3.1
Poultry	12.4	5.3	1.2	0.9	47.5	18.1			8.2	2.2	2.1	1.2
Milk									7.3	3.5		
Butter	15.4	7.4	10.4	9.2	23.6	12.1			6.3	3.2	4.4	1.7
Cheese	6.5	4.2	4.7	4.7	7.8	5.4			7.9	3.3	2.5	1.3
SMP	9.8	6.7			9.8	6.7			9.0	2.8	1.9	1.5
WMP	7.9	5.3			7.9	5.3			8.5	2.5	2.8	1.5

	Feed cost index EU-15		Feed cost index EU-12	
	Macro	Yields	Macro	Yields
Non ruminant feed	9.1	7.9	8.3	9.3
Ruminant feed	9.1	7.6	8.3	9.0

Note: (1) The figures in the table are the average annual coefficient of variation of the baseline projections for the period 2011-2020, calculated over the 80% central values in the stochastic simulations (see the text for more explanation). (2) '*' in the net trade columns indicates that the EU is on average a net importer of this product. Therefore, the uncertainty shown is relative to average *net imports*. Otherwise, it is relative to average *net exports*.

Trade flows: on the whole, both exports and imports of cereals tend to be more affected by yield uncertainty than by macroeconomic uncertainty. The picture is less clear for livestock products. The dominant source of uncertainty depends on the products, and on the direction of

the flow. The consequences for the degree of uncertainty in the 2011-2020 baseline projections of net trade are, in some cases, very large. For example, simulated net trade in biodiesel and in beef and veal is particularly sensitive to the uncertainty underlying the macroeconomic assumptions (with variability of the central 80% values at more than 100% of their mean), whereas projected net trade in maize is the most sensitive regarding yield uncertainty. It should be recalled that the figures shown in the table reflect not only the cumulative uncertainty of projected supply and demand for each product but also the *volume* of average net trade itself, since the variability in the net trade flow is expressed relative to its mean. A strong conclusion can be drawn here: although the uncertainty in the macroeconomic and yield assumptions imparts a degree of uncertainty to virtually all the baseline projections, it is the trade flows and particularly the net trade projections that have to be treated as the most uncertain as a result of these two sources of uncertainty in the assumptions.

Prices: For all the commodities shown except biofuels, projected EU prices are more subject to both macro and yield uncertainty than are world price projections. It is striking that EU yield uncertainty is only very marginally transmitted to the projection of world market biofuel prices, but the consequences of macroeconomic uncertainty (recall that this also includes uncertainty about the crude oil price) are much greater for world biofuel prices. The uncertainty due to macro uncertainty in the EU price projections for biofuels is less than that of world market prices for ethanol but roughly the same for biodiesel, reflecting the different degree of EU trade protection for these two fuels, which results in a higher degree of price transmission between the EU and world markets for biodiesel than for ethanol.

The greater part of the uncertainty characterizing producer prices for cereals, whether arising from uncertain macroeconomic assumptions or uncertain yield assumptions, is transmitted to animal feed costs. Yield-induced uncertainty in feed costs is greater for EU-12 than for EU-15 because the degree of uncertainty in the yield assumptions themselves was estimated to be higher for EU-12.

In general, the sensitivity of projections of EU producer prices for cereals and for livestock products to the uncertainty in macroeconomic conditions is roughly comparable (with most products having an average variability relative to the mean in the range 7-10%). By contrast, projected EU producer prices for crop products are considerably more sensitive to yield uncertainty than are prices projected for livestock products, despite the considerable variation in feed costs that is attributed to the two sources of uncertainty.

A few other more general points can be made. First, according to the assumptions about market behavior in the AGLINK-COSIMO model, it is projections of trade flows rather than stocks that absorb the greater part of the uncertainty in the underlying assumptions. Second, the macroeconomic uncertainty whose consequences have been investigated in this exercise does not cover the whole range of potentially uncertain macroeconomic assumptions. In particular, although the uncertainty in the USD/EUR exchange rate and in the price of crude oil has been allowed for, uncertainty in GDP growth is recognized only for the EU, and assumptions about growth in the US, China and elsewhere have been treated as known with certainty. Whether including the uncertainty coming from these sources would dampen or increase the consequences of macroeconomic uncertainty for projected outcomes in EU agricultural markets depends on whether these assumptions are positively correlated or offsetting. It seems more likely to assume a positive correlation between the growth rates of the world's major economies, and that in particular the assumptions about when and how quickly these economies will emerge from recession are highly correlated. By contrast, the uncertainty underlying the assumed yields for *all* the EU arable crops modelled is included in the yield uncertainty analysis. It is true that assumptions about yields in third countries have been treated as known with certainty. However, yield variations in third countries are not

strongly inter-correlated and the transmission of uncertainty from that source must pass through world market prices and be transmitted by that route to EU markets. Therefore, the consequences of not extending the yield uncertainty analysis globally are probably quite small. This would suggest that the implications of macroeconomic uncertainty revealed in this exercise are, in comparison with those of yield uncertainty, rather conservative estimates of the full extent to which the baseline projections embody uncertainty from this source.

11 Limited GDP growth in China

The prospects for agricultural markets in the EU depend strongly on the future development of macroeconomic scenarios (i.e. GDP growth, oil price, exchange rate) in Europe but also outside the EU. Macroeconomic conditions outside the EU may influence the world market equilibrium by changing world demand and supply of agricultural commodities and world prices, and these changes will be transmitted to some degree to EU agriculture via agricultural trade flows.

During the last five years, Chinese average annual growth rate reached 11.2% and the annual projected growth rate for the next five years is around 8.5%. The Chinese government is now planning to lower its GDP growth for 2011-2015 to 7% a year[17]. It is reasonable to assume that a lower Chinese GDP growth would reduce demand for all commodities and fuels, causing a possible reduction in their world prices. Due to the size of the Chinese economy, the effect on world and domestic EU markets could be significant.

The main purpose of this chapter is to analyse the effects of slower GDP growth in China on EU-27 agricultural markets. For this task, two models are used in combination: the computable general equilibrium model GLOBE and the partial equilibrium model AGLINK-COSIMO.

11.1 Scenario settings

The main assumption of this analysis is that China lowers its GDP growth to 7% during the period 2011-2015. The contributions of the two economic models are sequential, as follows:

- The lower GDP growth in China is modelled in GLOBE to generate the changes in GDP growth for all other countries and the change in world crude oil price. These outcomes are introduced as exogenous values into AGLINK-COSIMO.
- AGLINK-COSIMO simulates a scenario based on the new macroeconomic assumptions. This chapter reports the resulting changes in outcomes on EU and Chinese agricultural markets modelled in AGLINK-COSIMO.

Given that the Chinese government's plan to lower economic growth between 2011 and 2015 will have longer-run effects on the world economy, the annual changes in macroeconomic variables are calculated up to 2020. The effects of the new macroeconomic scenario are reported for 2020, which is the final year for the current EU-27 baseline. No changes are assumed for the exchange rate.

Limited impact on other countries' GDP and reduction in crude oil price

The slower Chinese GDP growth means a reduction in China's annual GDP growth rate between 2011 and 2020 of around 10% compared to the annual growth assumed in the baseline[18]. The effects of slower Chinese GDP growth on other countries' annual growth rate in the same period are below 1%. The most positively affected countries are: MERCOSUR[19] (+ 0.5%) and Oceania (+ 0.2%) while Canada (- 0.2%) experiences the most negative effect.

17 Yuanyuan, H. (2011). Premier Wen sets 7% growth target. China Daily (28-02-2011). This new target should allow Chinese government to better control inflation, reduce carbon intensity by 40-45% and increase water efficiency (see Qiu, J. (2011). China unveils green targets. Nature 471(149). March 9)

18 The baseline assumes an annual growth rate of Chinese GDP between 2011 and 2020 of around 8% while in the new scenario the annual growth rate is lowered to around 7%.

19 MERCOSUR countries are: Paraguay, Uruguay, Brazil, Argentina

The oil price, however, is more influenced by the slower Chinese GDP growth. Its annual rate of growth decreases by 4.5% over the projected period in comparison to the growth foreseen on the baseline.

11.2 Results

Table 11.1 Percentage change in world and EU-27 prices relative to the baseline in 2020

Country	Wheat	Coarse grains	Poultry	Pork	Beef & veal	Cheese	Butter	SMP	WMP
China	-6	-8	-7	-7	-6	-10	-6	-6	-8
World	-2	-3	-2	-1	-1	-0	-1	-0	-1
EU-27	-3	-2	-1	-1	-1	-1	-1	-0	-1

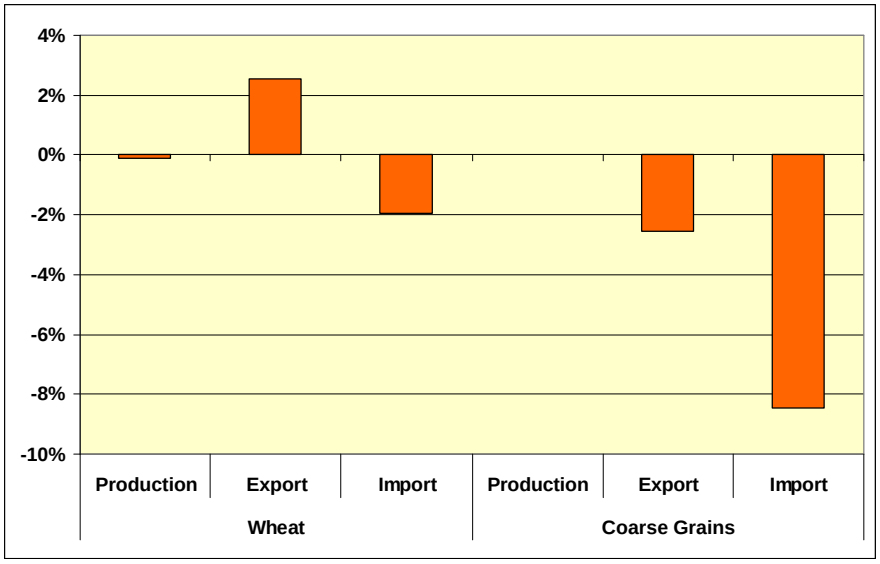
Worsening of EU net trade for coarse grains

The impacts on grain prices on the Chinese domestic market (-6% for wheat and -8% for coarse grains, relative to the baseline values for 2020) are only partially picked up by world market prices, and consequently the impacts on EU producer prices are also much smaller, decreasing by 3% and 2% respectively. The lack of convergence between the price changes on the Chinese and world markets reflects China's state-managed trade in these commodities.

EU-27 wheat and coarse grain production is almost unaffected by changes in Chinese GDP because the decrease in EU-27 prices is rather small. However, the decline of Chinese exports by 6% leads to a 3% increase in EU wheat exports. These higher exports are also possible because of the lower use of wheat for ethanol production as explained below.

The EU-27 exports of coarse grains (mainly maize and barley) are 3% lower due to the lower level of Chinese imports. The redirection of domestic production from exports to internal use, and most of all, the decrease of coarse grains use as feedstock for ethanol production, causes EU imports to shrink by 8.5%. EU-27 is a net importer of maize in the baseline and in the current scenario. However in current scenario EU-27 improves its net trade position on maize by 12% mainly due to shrink in imports by 9%. On the barley side EU-27 is net exporter in the baseline and in the current scenario, but net trade is negatively affected (-3%) due to decline in exports by 3%.

Graph 11.1 Impact on the EU-27 cereals sector in 2020, relative to the baseline



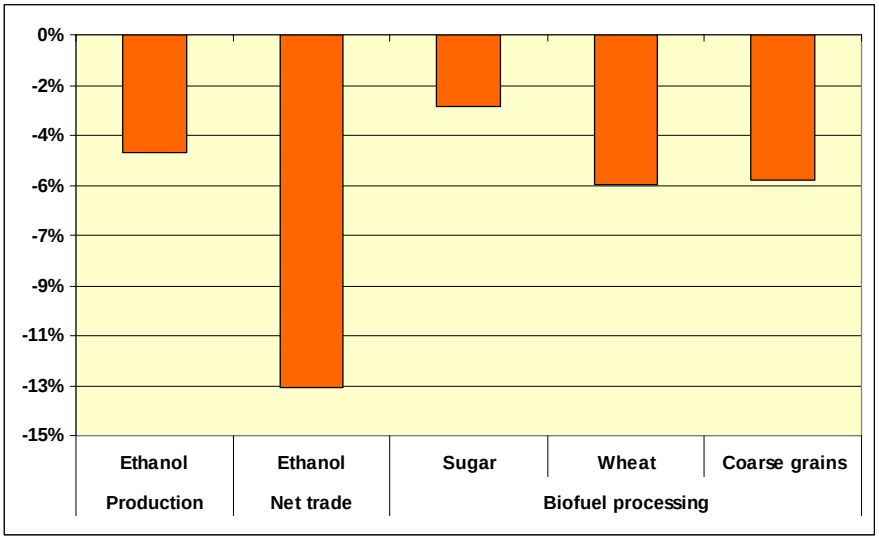
The lower oil price reduces ethanol production

One of the main effects of slower Chinese GDP growth is lower world demand for fuel and energy products and consequently lower world prices for these commodities. Under these new assumptions, biofuels become less competitive relative to traditional fossil fuels.

As a consequence, ethanol production in EU-27 is more than 4% lower (Graph. 11.2).The biofuel mandate in force within the EU impedes a reduction of the domestic consumption of biofuels. The lower level of domestic production is compensated by imports from third countries, due to a relatively greater price fall for ethanol feedstocks (wheat and coarse grains) in these countries. The final result is an increase by almost 13% of the EU's net imports of ethanol, relative to the baseline. Lower EU ethanol production is accompanied by a reduced use of feedstocks: sugar (-3%), wheat and coarse grains (around -6%).

The implications for EU production of biodiesel are much smaller. Chinese production of biodiesel is almost zero and is not modelled in AGLINK-COSIMO. Thus, biodiesel production in the EU is only affected by the lower oil price and the final effects on the sector, even if similar (lower production, stable consumption and a deteriorated net trade position) are much smaller than for ethanol.

Graph 11.2 Impact on the EU-27 ethanol sector in 2020, relative to the baseline



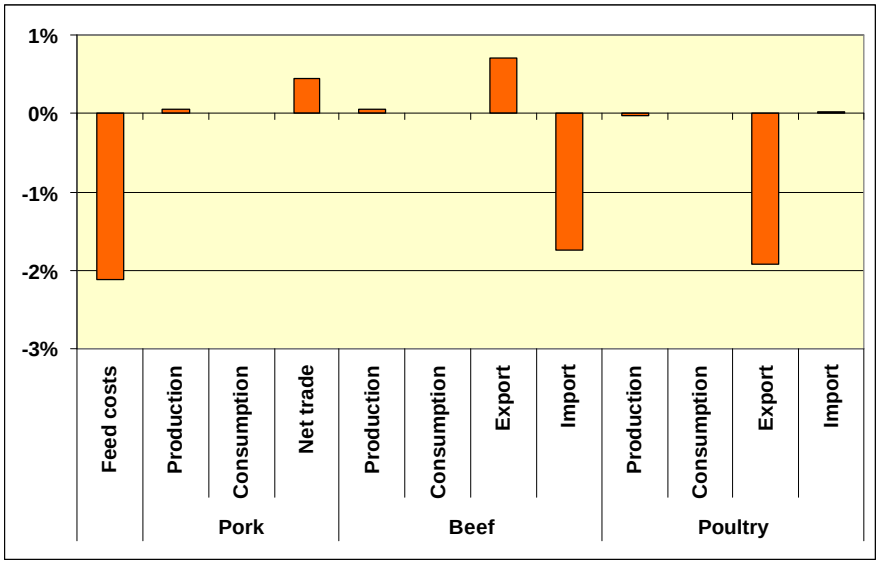
Small positive impacts on beef and pork, negative impacts on poultry

The effects on the EU-27 meat sector of a lowered Chinese GDP growth are small. As in the case of cereals, although China is the world's largest pork producer and its second largest poultry producer, China's trade is a state managed. Therefore, the transmission of the lower Chinese prices to the EU is very weak (Table 11.1). In addition, meat markets are also indirectly affected through the effect of lower cereal prices, leading to a decline in feed costs by more than 2%. However, in the end, EU meat prices are lower by 1% only.

The lower feed prices imply a decrease of production costs in the EU and affect the EU markets for beef and pork. European production of pork barely increases but the EU net trade position improves (Graph. 11.3). Domestic production of beef and veal rises by less than 1%, but this boosts exports which are almost 1% higher than in the baseline. The substitution of imports by internal production shrinks imports by almost 2%.

Poultry EU production is marginally lower while the net trade position for poultry deteriorates. Due to lower internal demand, China can export more (+16%) at a lower price and imports less (-14%) considerably improving its net trade position. Consequently, the EU's poultry exports are 2% lower, as is its share of the world poultry market.

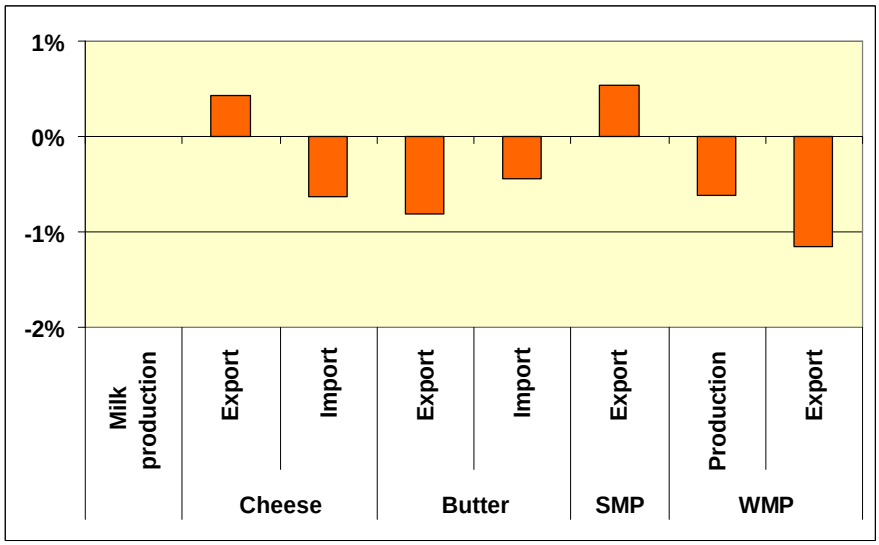
Graph 11.3 Impact on the EU-27 meat sector in 2020, relative to the baseline



Whole milk powder suffers a slight production loss

The transmission of the lower Chinese prices (6-8% below baseline levels) to the world markets for dairy products is very weak, with world price declines of 1% only. China plays a small role in world dairy markets, except for SMP and most of all for WMP. China is indeed the world's largest WMP importer and the decline in Chinese WMP imports by 25%, relative to the baseline, affects the EU market. However the EU WMP production decreases only by less than 1% and exports by 1%. For other EU dairy products, the consequences of slower Chinese growth are even smaller (Graph 11.4): milk production is marginally lower, the cheese net trade position is slightly better (around 1% higher than in the baseline), net trade in butter very slightly lower and SMP exports slightly higher.

Graph 11.4 Impacts on the EU-27 dairy sector in 2020, relative to the baseline



12 Higher production costs in the EU-27

In recent years, farm input costs have been rising due to greater competition for production resources in both the EU and the global economy. Recent studies[20] show that these cost increases particularly concern energy, labour, fertilizers, machinery, seeds and crop protection expenses. According to Eurostat data, real purchase prices of key agricultural inputs like fuel and fertilizers increased between 20 and 60 per cent over the period 2000-2010, with most of the increase occurring in the last four years. Farm level analysis indicates similar upward trends in EU farm production costs: a slow but steady increase in the last decade that escalates from 2005 onwards.[21] This sudden jump in costs coincides with the start of the global commodity boom.

Apart from relatively predictable trends in competition for resources, increasing uncertainties in the global economy also have an impact on production. Higher volatility of oil price and exchange rates increases the error of input cost projections. The uncertainty attached to costs translates into more uncertainty regarding commodity supplies and farm incomes, via its effect on farm profit margins. In addition, cost-driven supply adjustments have an indirect effect on agricultural markets and prices, and hence further increase the uncertainty in the outlook projections.

12.1 Scenario settings

In order to assess the implications of uncertainty in input prices for the baseline projections, two scenarios were implemented in CAPRI. In the 'plus-10' scenario, exogenous input costs are assumed to be 10% higher than the level assumed in the projected baseline. In the plus-30 scenario, input costs are assumed to be 30% higher than in the baseline. These shocks are based on, respectively, the observed fluctuations of the input prices around trend in recent years and the sharp increase in the trend since 2006. Although uncertainty regarding input costs implies that actual costs could be higher *or lower* than what has been assumed in the baseline, this exercise investigates the sensitivity of outcomes to higher levels only.

According to the FADN[22] definition, operating costs cover all cash expenditure necessary to operate the farm but excluding wages, rent and interest paid. Most of these FADN operating costs are covered by CAPRI. However, feed costs and the purchase cost of young animals are calculated based on endogenous prices and so can not be modified directly as a scenario assumption. In our simulations, these last two cost items are affected only indirectly through the price feedback coming from commodity and young animal markets. The following costs are directly increased in our scenarios: mineral fertilizers, fuel and energy costs, maintenance, pesticides, seeds, services and veterinary costs. However, for those cost items not directly changed in the scenarios, indirect effects are nevertheless observed. Feed costs, for example, increase due to higher prices on the cereals and oilseeds markets. Indirect effects are also observed in the case of organic fertilizers: the share of organic fertilizers in total fertilizer use increases as its price relative to that of mineral fertilizers decreases.

20 USDA (2011). Agricultural Prices. National Agricultural Statistics Service (NASS), Agricultural Statistics Board, United States Department of Agriculture (USDA). http://usda.mannlib.cornell.edu/usda/current/AgriPric/AgriPric-09-29-2011.pdf

21 European Commission (2011). Farm Economics brief, N°2 EU production costs overview, DG Agriculture and Rural Development, Microeconomic Analyses of EU Agricultural Holdings. http://ec.europa.eu/agriculture/rica/pdf/Brief201102.pdf

22 FADN: Farm Accountancy Data Network

In the livestock sectors, operating costs are dominated by feed costs and the purchase cost of young animals, as explained above. Therefore, the actual increase in operating costs for livestock depends on the production cost structure and the impacts of the exogenous cost increases on crop prices. It follows that the impact on livestock operating costs differs considerably between agricultural sectors and geographical regions.

For example, in the dairy sector, total operating costs increase on average across EU-27 by about 3% in the plus-10 scenario and 8% in the plus-30 scenario. The regional differences are mostly due to the fact that the share of non-dairy-specific operating costs (fuels, energy, maintenance, services) varies significantly across the EU (see Map 12.1). In EU-12, the share of these cost items is generally smaller, resulting in smaller cost increases.

Map 12.1 Changes in input costs in dairy production

Plus-10 scenario **Plus-30 scenario**

In the CAPRI model, changes in the relative profit margins of different agricultural activities induce farmers to adjust their allocation of land to crops and animal production accordingly. The next section presents these impacts for both scenarios.

12.2 Results

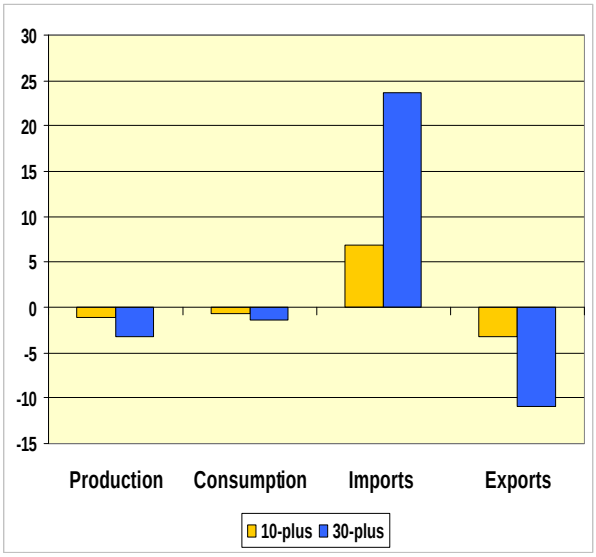
Deteriorating EU commodity balances

Due to the profit margin squeeze, total production of cereals and oilseeds in EU-27 decreases by 1% in plus-10 scenario (up to 4% in plus-30 scenario). There is a significant increase in set-aside and fallow land areas (2% in the plus-10 scenario and 5% in the plus-30 scenario), together with decreases in total utilized agricultural area of 1% in the plus-10 scenario and 2% in the plus-30 scenario. At the same time, very little substitution between crops is caused by the change in relative margins, and as a consequence, the land allocation pattern remains stable.

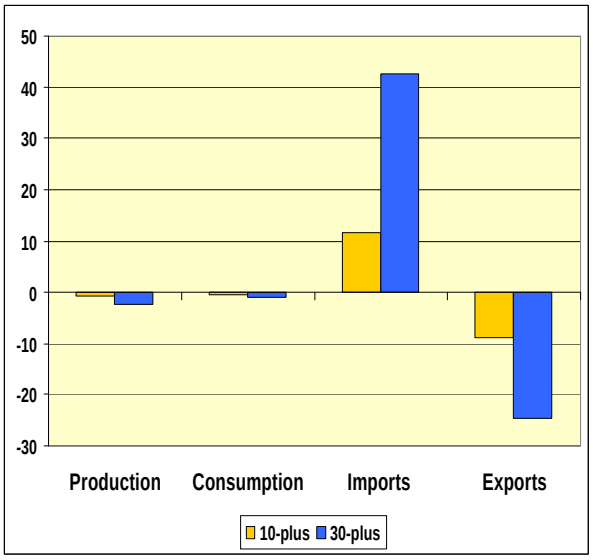
Commodity prices rise as EU production decreases due to inelastic total demand, with higher imports closing the gap created by the different rates of decline in production and consumption. Moreover, exports shrink as the EU becomes less competitive on the world markets due to higher internal prices. Consequently, the EU net trade position deteriorates. The pattern described here applies to both cereals and oilseeds (see Graph 12.1).

Graphs 12.1 and 12.2.: Impact of higher costs on cereals and poultry balances

Graph 12.1 Percentage changes in EU27 cereals balance sheet in 2020



Graph 12.2 Percentage changes in EU27 poultry balance sheet in 2020



The effects on production and consumption in the livestock sector are smaller than 1% in both scenarios except for poultry, where the decline in production reaches almost -2.5% in the plus-30 scenario. The much smaller impacts on livestock than crops is expected given the differences in cost increases already reported above.

Changes in imports and exports for livestock are driven by the same mechanisms as explained for crops. The biggest changes are observed for poultry meat (see Graph 12.2), whereas the EU net trade position for dairy products is hardly affected (less than 1%).

Impact on revenue and income

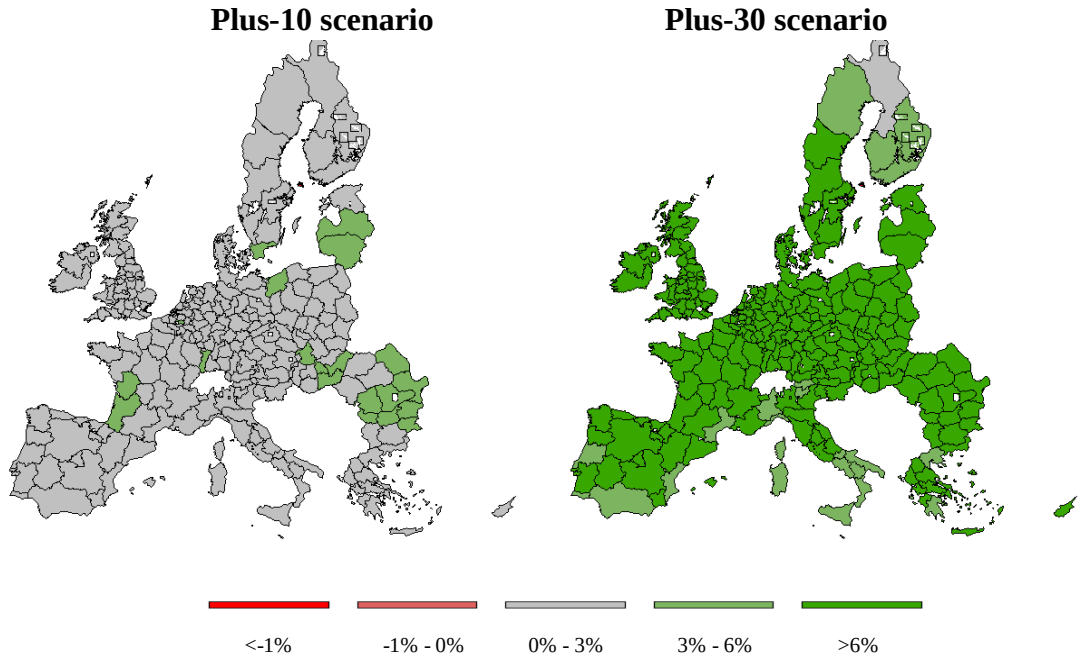
CAPRI calculates the revenue from agricultural activity as the total value of outputs *without* direct payments whereas gross value added (which is used as a proxy for income) corresponds to the value of outputs *plus* direct payments *minus* intermediate costs. This needs to be borne in mind when comparing revenue and income changes. Since direct payments are unchanged in these scenarios, the percentage change in revenue without direct payments will by definition be greater than that of revenue *plus* direct payments. However, since the income change calculation also includes cost changes, the relationship between revenue changes and income changes may not be linear.

In the maps below, crop revenues are shown per hectare of harvested area and livestock revenues are per head of animals in the particular sector covered.

Higher commodity prices do not prevent income falls in the crop sectors

Cereal revenues in EU-27 increase on average by almost 3% in the plus-10 scenario (except for durum wheat and paddy rice where the increase is around 1%). Increase in revenues shows the price effect coming back from the markets.

Map 12.2 Changes in total cereal revenue in the EU

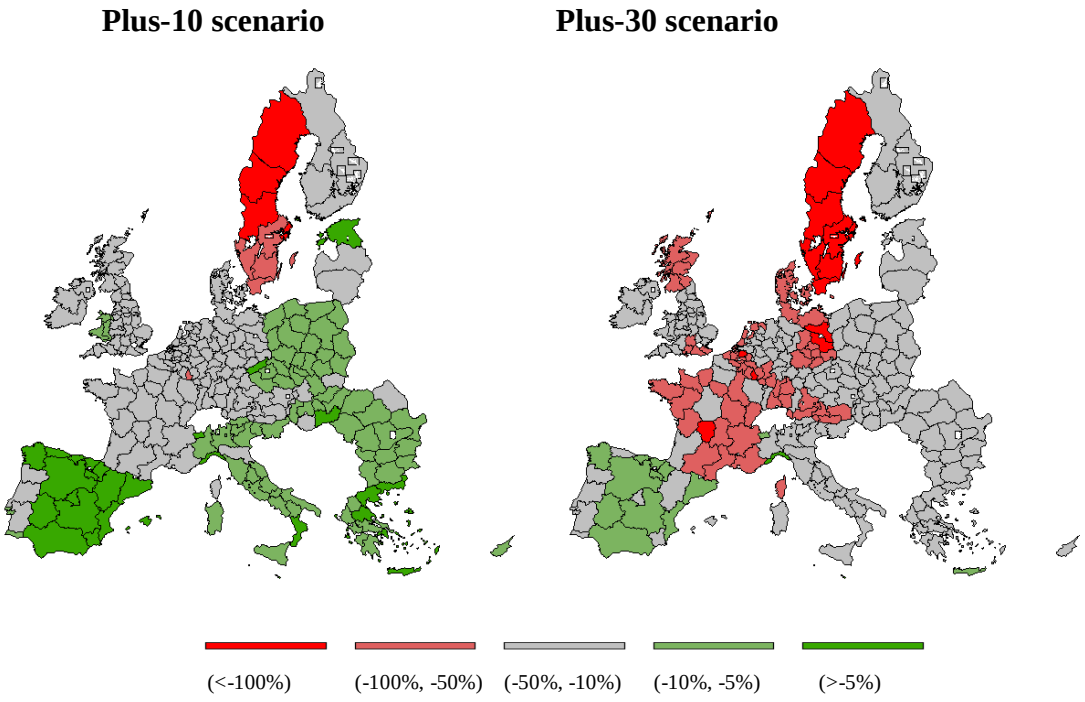


Map 12.2 shows that all regions in the EU have an increase in cereal revenue under both scenarios. The sources of regional differences in the development of revenues are threefold. First, producer prices are defined at Member State level. Second, the aggregated cereals price depends on the relative shares of different crops in the crop mix produced in each region. Third, the value of by-products (for cereals, the crop residues) is included in revenues and can be different from region to region. The impact on revenues can be even higher than the price effect coming from the commodity market as the value of crop residues increases due to the exogenous increase in fertilizer costs. This is because CAPRI features nutrient-balancing equations for crops. In short, they account for the nutrient requirements of crops that need to be covered by mineral fertilizers, manure and crop residues. Therefore, the scenario assumption of higher mineral fertilizer prices drives up the prices of crop residues as well as manure.

Map 12.3 shows that the impact of higher costs outweighs that of the increase in market due to lower suppliers, resulting in lower income to cereal production. The largest impact is for rye and meslin income (-13%) and soft wheat income (-10%). Generally, impacts on income are larger in EU-15 (-10%) than in EU-10 (-6%).

The most affected regions are those with input-intensive production (e.g. the Netherlands) and regions with small profit margins (e.g. Portugal). The decrease is most pronounced in regions where both of the above risk factors are present (e.g. Sweden).

Map 12.3 Changes in income for cereal production in the EU

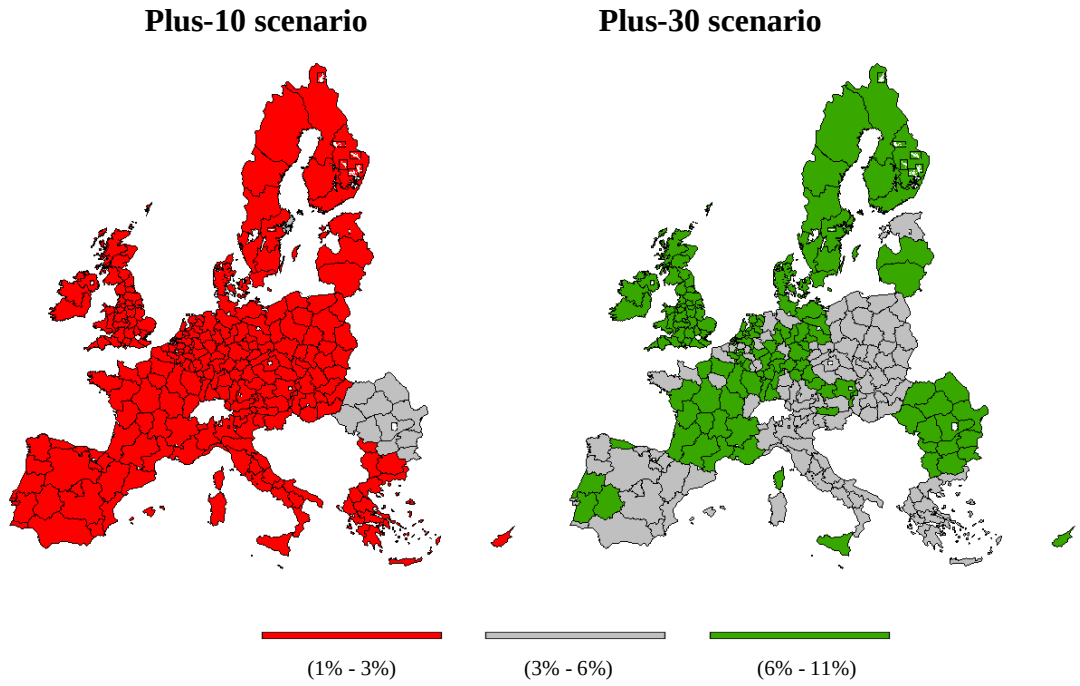


Mixed impacts in the livestock sector

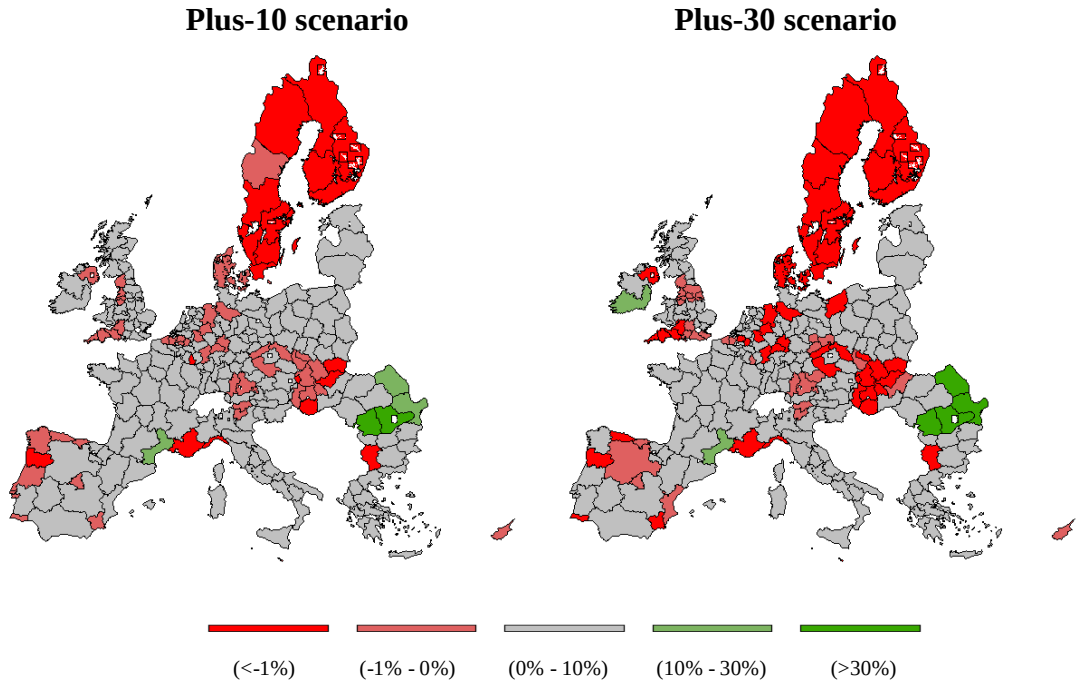
Revenue in the livestock sectors is generally higher (see Map 12.4) due to higher market prices and an increase in the value of by-products (mainly manure). The revenue changes for ruminants and non-ruminants are similar. Dairy revenue is 2% and 5% higher at the aggregate EU-27 level depending on the scenario. For cattle fattening, the increase is about 2% in the plus-10 scenario and 6% in the plus-30 scenario, and in line with the increase in beef prices. Pig-fattening revenue follows the higher market price for pork; at EU-27 level, the increase is about 2% in the plus-10 scenario and 5% in the plus-30 scenario with very small regional variation.

Impacts on dairy farmers' income are geographically diverse; in some regions an increase is foreseen while in others decrease is expected. Generally, regions with less input-intensive production technologies (more extensive, grass-based systems) like Ireland are better off, as when the production cost is relatively low, the effect of higher input costs on profit margins is small. At EU-27 level, income remains fairly constant in the plus-10 scenario with an average increase of less than 1%.

Map 12.4 Changes in revenues in livestock production in the EU



Map 12.5 Changes in income in the dairy sector in the EU



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Geographical differences in the income effects in the meat sectors are also found. Pig fattening income at the EU-27 level remains stable but some of the new member states (e.g. Romania, Poland) have significant increases (from 1% up to 4% depending on the scenario). Cattle fattening activities see an increase in their income of around 2% in the plus-10 scenario and 6% in the plus-30 scenario. The increase is generally higher in the new Member States, however, smaller absolute numbers are behind the bigger percentage changes (see Map 12.6).

Map 12.6 Changes in income in the beef sector in the EU

Plus-10 scenario **Plus-30 scenario**