

**SIXTH FRAMEWORK PROGRAMME  
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**Agriculture for sustainable development: A dialogue on  
societal demand, pressures and options for policy**

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**Driving Forces of European Agriculture**

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## Summary

The development of European agriculture is driven by many factors. In this policy brief we distinguish four groups of driving forces: i) factors in the global context, ii) factors that are linked to the demand for agri-food products iii) those that are linked to the supply of agricultural products, and iv) those of government policies. After a short introduction (1), these factors are described in separate chapters (2-5). In chapter 6 some reflections are presented on issues that result from globalisation. The main conclusions on the driving forces are formulated in the final chapter 7, combined with some recommendations for research.

Chapter 2 considers the global context. The driving forces at the global level are analysed in the Agricultural Outlook 2006-2015. The location of production, particularly for bulk agricultural products, is shifting towards the developing world and away from the developed countries. Weather-related production shocks, energy price trends, investment in bio-fuel capacity, economic growth prospects and future agricultural policy developments are among the main uncertainties affecting the prospects for world agricultural markets.

Chapter 3 shows that the demand for food in Europe is driven by demographic and macroeconomic forces. It is expected that the population growth will stagnate and that economic growth will be moderate. Food preferences arise from a combination of different factors and drivers such as economic (e.g. income), demographic (e.g. household size, age), social (e.g. consumer trend), emotional (e.g. ethics such as animal welfare), political (influence of policies) or even others such as lifestyle, concerns for health or environment.

Chapter 4 deals with the factors that drive the supply of agricultural products. In recent decades the capital intensity of agricultural production has increased dramatically, resulting in productivity growth, improved competitiveness and compliance with product quality standards. The application of technology can result in environmental problems, but technology can also offer the key to the resolution of those problems.

Chapter 5 highlights the policies of the EU that are directly relevant for agriculture. Attention is given not only to the CAP, but also to regulations in the field of environment and food safety.

Chapter 6 reflects on research issues with respect to agricultural development and government policies. Governments have generally supported the process of international liberalisation of agri-food markets. However, some of the consequences of that globalisation are negative and they raise concerns, because globalisation entails a reduction of their ability to cope with these consequences.

The concluding chapter 7 points out that agriculture and the rural economy should not be regarded as synonymous: many rural areas are driven by other sectors than agriculture. The chapter also raises the question whether and to what extent policy research actually contributes to policymaking and how the situation might be improved.

# Driving Forces of European Agriculture

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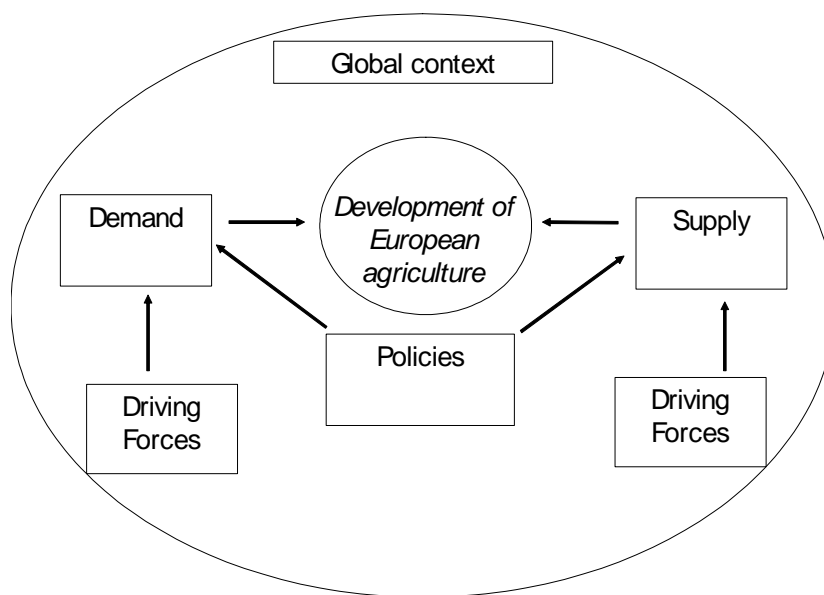
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## 1. Introduction

This paper deals with the factors determining developments in European agriculture as well as related sections of the industry (the agri-food sector). These driving forces are linked to the demand for agri-food products on the one hand and the supply of agricultural products on the other hand. Both are influenced by the general economic and political developments, of which the economic globalisation is the dominant force. The globalisation of agri-food markets is characterised by the growth of international trade, of foreign direct investments, and of the importance of multinational food companies.

The analytical framework is presented in figure 1.



**Figure 1. Analytical framework**

The driving forces of demand and supply are first-order drivers such as: demographic developments, macro-economic development, consumer preferences, availability of production factors, entrepreneurship and agricultural technology. The effects of the first-order drivers may be corrected or enhanced by the second-order drivers, which consist of general economic and regional policies, agricultural and trade policies, as well as environmental and consumer policies.

## 2. Global context: world agricultural markets

### 2.1 Introduction

The development of world agricultural markets is assessed annually by the OECD and FAO in their Agricultural Outlook<sup>1</sup>.

<sup>1</sup> This is the second occasion that the Agricultural Outlook report has been prepared jointly by the Organisation for Economic Co-operation and Development (OECD) and the Food and Agriculture Organisation (FAO) of the United Nations.

The latest edition offers an assessment of agricultural markets covering cereals, oilseeds, sugar, meats, milk and dairy products over the period 2006 to 2015. The assessment is based on a set of projections, that are conditional on specific economic and policy assumptions and which present a baseline scenario for the evolution of these markets over the next decade. As such, they provide a benchmark for the analysis of agricultural market outcomes that would result from alternative assumptions. The analysis in this chapter is based on this report.

## 2.2 Macroeconomic assumptions

The projections of OECD-FAO are set against a macroeconomic background of sustained optimism. The global economy has been expanding at a pace greater than 4% per year over the past four years, with economic growth expected to become more broadly-based over the medium term, along with slower global population growth and continuing low inflation. The near-term growth prospects are strong, in particular in North America and Asia. Growth is vigorous in the United States and expected to remain solid for the duration of the outlook, playing a large role in determining economic conditions around the world. In Japan, expansion has become more broad-based, but current rates of growth are not expected to be sustained over the medium term. Activity in Europe is recovering in an environment of low interest rates and a depreciating euro. The latter contributes to buoyant export markets, which are expected to lead the recovery into stable long-term growth.

### *Developing countries*

The growth potential of large developing economies has made them key drivers of global economic growth. They play an expanding role in world trade of agricultural commodities and make up an increasing share of global food demand. Activity remains dynamic in much of Asia, with domestic demand and trade expansion in China and India driving growth not only in the near term, but throughout the outlook horizon. Expansion of agricultural exports is a key underlying factor for growth in both Argentina and Brazil, which is expected to exceed that of most OECD countries. Economic growth in Russia, as in other CIS countries, has dampened but will remain robust, driven by high oil revenues. This global economic outlook also has persistent downside risks that may have important impacts on agricultural markets. There are uncertainties about the long-term sustainability of unprecedented current account deficits in the US and over the prospects of monetary tightening in both Japan and the euro area. Along with income growth, population prospects are an important determinant of the future global economic environment, affecting both the supply and demand for agricultural commodities.

Population growth over the next decade will decline relative to the last 10 years, with world population growing on average 1.1% annually (table 1), to reach approximately 7.2 billion in 2015. The highest population growth is in Africa (annual average above 2%), whereas in Europe, population is expected to decline over the coming decade, particularly in Central and Eastern European countries. In many developing countries, arable land constraints may provide incentives for rural population to increase the production capacity of labour-intensive agriculture commodities like fruits and vegetables. In so far that this means they better exploit their comparative advantage, such shifts in production may contribute to economic growth in these countries.

**Table 1. Where population and income is projected to grow**

Average annual growth rate over 10 year period and rural and income share (%) in 2005

	Population			Income		2005 income share
	1996- 2005	2006- 2015	2005 rural share	1996- 2005	2006- 2015	
<i>World</i>	1.26	1.10	50.8	2.64	2.90	100
Africa	2.24	2.08	60.3	3.50	3.78	1.8
Latin America and Caribbean	1.47	1.20	22.4	2.03	3.61	5.7
North America	1.00	0.87	19.2	3.02	3.21	28.7
Europe	0.00	-0.11	26.7	2.33	2.17	32.1
Asia	1.28	1.07	60.1	2.64	3.13	30.2
Oceania	1.36	1.10	26.7	3.48	3.09	1.6

Source: OECD-FAO, 2006.

Expected income growth over the next decade is highest in Africa and Latin America, with annual average growth rates approaching 4%. But these regions grow from a relatively low level and thus contribute the lowest shares to total world output. Still, compared to the mature markets of OECD, income gains in developing countries tend to translate more directly into stronger demand for higher value agricultural commodities, such as meat and dairy products, demand for which is more responsive to rising incomes. Thus, dynamic developing economies can represent growing import markets, not only for primary agricultural commodities but also for more processed products.

#### *Inflation and energy prices*

The evolution of crude oil prices is an important element. The higher price of oil affects agricultural markets not only through increased production costs, but also through its influence on the production of substitute biofuels. Over the medium term, oil prices are assumed to stay well above their average level during the first years of this decade, but nevertheless to decline gradually to around USD 40 per barrel by the end of the outlook period, consistent with medium term projections of the OECD Economics Department. Sustained high oil prices when compared to the early years of the current decade shift agricultural production away from energy-intensive commodities and make capital investment in biofuel production facilities more economically feasible. Despite the oil price hikes, global growth and world trade expansion, general price levels in many countries have remained stable. This has reinforced expectations that inflation in OECD countries will remain low in the long-term. Relative to the 2000-04 average, estimates of the annual inflation rate for 2005 are slightly lower in both the euro area and for the OECD as a whole, and there have been notable declines in Mexico and Canada. In many of these countries, inflation rates are below 3% and are expected to remain so throughout the outlook horizon. The inflation rate has been reduced significantly in Brazil since 2003, yet in Argentina and Russia it remains a serious concern.

#### *Increased imports in non-OECD region*

With their increasing affluence and faster population growth, despite some decline relative to the last decade, the countries in the non-OECD region are expected to continue to experience a more rapid increase in consumption of agricultural products than countries in the OECD area. In spite of rising production, faster consumption growth is expected to lead to increased imports of agricultural products by the non-OECD area as a whole. The Outlook foresees an intensification of competition for

these growing markets between traditional OECD exporting countries and those exporters in the developing world. For the Least Developed Countries with more limited prospects for income growth, the projections imply increased reliance on international markets to feed their populations and thus growing exposure to the vagaries of commodity price changes and fluctuations in import bills.

#### *Exchange rates*

Assumptions on exchange rates are critical to the baseline projections of the Outlook as they can strongly influence relative competitiveness and hence agricultural trade across regions. Over the course of the outlook period beyond 2006, the euro exchange rate is projected to remain stable. However, very low levels of inflation in Japan relative to the United States mean that the yen is expected to appreciate. With the expansion of global trade opportunities, there is an increasing importance placed on the exchange rates of developing countries vis-à-vis the US dollar because of their prime influence on global terms of trade and external imbalances. Of particular interest is the Chinese yuan, which has appreciated by almost 3% since the adoption of a more flexible management system in July 2005 and is expected to appreciate even further over the outlook horizon.

#### *Trade policies*

As the WTO negotiations on the Doha Development Agenda have not yet come to a conclusion, the Outlook is based on existing policies and any future changes that have already been decided. Specifically, the outlook projections assume that trade policies as agreed in the Uruguay Round Agreement on Agriculture (URAA) will hold for the entire period to 2015. The policies and provisions of established regional and bilateral trade agreements such as the North American Free Trade Agreement (NAFTA), the Everything But Arms (EBA) initiative of the European Union and the Mercosur agreement between Argentina, Brazil, Paraguay and Uruguay are taken into account in the Outlook.

#### *Major uncertainties*

Weather-related production shocks, energy price trends, investment in bio-fuel capacity, economic growth prospects and future agricultural policy developments are among the main uncertainties affecting the prospects for world agricultural markets. A major uncertainty for the Outlook is the outcome of the Doha Development Agenda of multilateral trade negotiations. The prospects for world agricultural markets are highly dependent on economic developments in Brazil, China and India, three of the world's agricultural giants.

### 2.3 Commodity market trends

#### *General*

World agricultural production is projected to expand steadily over the next decade, but at a slower rate than during the previous ten years. Per capita food consumption is increasing with rising incomes and growing trade. Increasing local production and lower costs from more efficient transport and product distribution systems as well as consumption shifts due to urbanisation and dietary changes are factors that add to this evolution in developing countries. In these countries, there is an increased emphasis on livestock products and animal feedstuffs compared to food grains. In the more

developed markets, concerns with the availability of food have been replaced by those for food attributes and quality.

#### *Wheat and coarse grains*

Global trade for wheat and coarse grain is expected to grow moderately. The traditional five major wheat exporting countries of Argentina, Australia, Canada, the EU and the US maintain their dominant position in world wheat trade over the outlook period, with their combined market share changing only little. Wheat import growth will be concentrated in those developing countries with rising per capita incomes and population, but which are also facing land or climatic constraints on expanding domestic production. Growth markets are found in Africa (particularly Egypt and Nigeria), Brazil and Mexico. Trade in coarse grains remains closely tied to expansion in domestic livestock production, particularly in countries unable to meet their own needs for feedstuffs.

#### *Oilseeds and products*

Strong demand for vegetable oil for food consumption and protein meals used in livestock feeding is expected to sustain global trade in oilseeds and oilseed products to well above that of world wheat and coarse grains trade throughout the next decade. Investment in crushing capacity goes hand in hand with growing trade in protein meal. Such investments have been made in China, in particular, in order to capture the value-added in processing. Consequently, China accounts for the bulk of the growth in oilseed imports over the outlook period and strengthens its position as the leading importer. The EU which formerly held this position is not expected to further increase imports because of increased use of domestically produced rapeseed meal, as rapeseed crushing surges in response to rising demand for oilseed derived biofuel. Growth in import demand for vegetable oils is projected to exceed that for protein meals. While vegetable oil imports increase in almost all regions, China, India, Pakistan and the EU remain the largest importers. The three leading oilseed exporters, the US, Brazil and Argentina, account for more than 80% of world trade throughout the outlook period.

#### *Sugar*

Brazil currently accounts for around 40% of world sugar exports. Rising exports of raw and refined sugar are projected for Brazil over the period to 2015 and these will increase the country's dominance of the world sugar economy and be an important moderating factor on future world sugar price prospects. Developments taking place in Brazil's sugarcane-based ethanol sector are not expected to unduly constrain sugar production and exports to 2015. Following reform of its sugar regime, the EU is expected to reduce production and subsidised exports of sugar and to undergo a switch in trade status from a net exporter to a growing importer of sugar. Sugar imports are less concentrated than exports. Russia is expected to remain the leading importer of raw sugar, but with imports projected to grow strongly in the European Union under the Everything but Arms (EBA) Initiative as well as in China as the latter's consumption of sugar increases with continuing economic growth.

#### *Meat*

In addition to market access gains achieved under global trade agreements over the past decade, growth in international trade in livestock products has become increasingly dependent on demand from developing countries. In the developed country markets, where per capita consumption is generally high, and demand either

stable or falling for some products, concerns about the availability of food have been largely replaced by those related to other product and/or process attributes and food quality. However, trade in meat products has been frequently affected in the last decade by animal disease outbreaks and their after-effects (i.e. delays in lifting trade embargoes by importing countries, investment decisions in the sector). These are a dampening factor on otherwise generally positive prospects for world meat trade, driven by an expectation of rising per capita incomes in a broad range of importing countries over the outlook period. The EU's position as a net exporter of beef is expected to erode as a result of policy reforms.

### *Dairy*

World dairy prices are expected to stay firm over the outlook period, as rising demand in developing countries, particularly in East Asia, North Africa and the Middle East, is combined with limited anticipated growth of exports from traditional suppliers from Oceania and Europe. The strong growth in demand in the non-OECD region reflects not only faster population and income growth, but also the effects of continued urbanisation and technological and product development within the dairy industry in these countries. In the majority of OECD countries, per capita consumption is already high. In terms of individual product categories, consumption in the OECD area is expected to increase for cheese only, while butter, whole milk powder and in particular consumption of skimmed milk powder is projected to decline. Australia, New Zealand and the EU remain the biggest exporters in world dairy markets. Nevertheless, EU butter and Skimmed Milk Powder (SMP) exports are projected to decline considerably following the cut in price support associated with the CAP reform.

## **3. Demand for food in the EU**

### 3.1 Economic growth and population size

For Europe, stagnation in the population growth and moderate economic growth are expected. Until recently, there was still a natural increase in the population of Europe (an excess of births over deaths) combined with added population growth through immigration. The natural growth rate is low in most EU-15 countries, even negative in some countries. It is only through immigration that the population continues to grow, but this remains limited to less than 2% over the next 20 years (table 2). A decline is even expected as of 2020.

In the new member states of the European Union - with 75 million people in 2005 - a population decline is already happening. Low - and in some cases already negative - birth excesses are combined with net emigration in countries like Poland, Latvia and Lithuania. According to the UN, this will lead to a decline in the size of the population in the EU-25 as of 2015. The OECD is already assuming a slight decline (-0.07% per year) in the population size of Europe over the next few years (until 2014).

**Table 2. Population (in millions) of the EU-15, the EU-25 and the EU-28 and a number of individual EU countries, 1975-2025**

	1975	2005	2025
EU-15	349	377	384
EU-25	418	452	454
EU-28 1)	489	551	575
Germany	79	82	82
France	53	59	64
Italy	55	57	53
Poland	34	39	37
Spain	36	41	40
Turkey	41	68	89
United Kingdom	55	59	63

1) EU-28 = EU-25 plus Bulgaria, Romania and Turkey.

Source: United Nations.

Only the population of Turkey (not acceding to the EU until 2015 at the earliest) is expected to continue to grow strongly. All in all, for the time being, the population in the EU-25 is stable and for that reason no major changes in demand can be expected.

### 3.2 Consumer (food) preferences

Food preferences arise from a combination of different factors and drivers such as economic (e.g. income), demographic (e.g. household size, age), social (e.g. fashion), emotional (e.g. ethics such as animal welfare), political (influence of policies) or even others such as lifestyle, concerns for health or environment (figure 2).

	Drivers
Households	Income, number of double-income households
	Households size (single and number of children)
	Number of women at work
Lifestyle	Time factor
	Social behaviour, fashion
	Values – individualisation
	Mealtimes and snacking
	Supermarkets
Quality	Concerns for health
	Food scares
Ethics	Concerns for animal welfare
	Environmental concerns

**Figure 2. Drivers that have influenced consumer food consumption in the period 1990 – 2005**

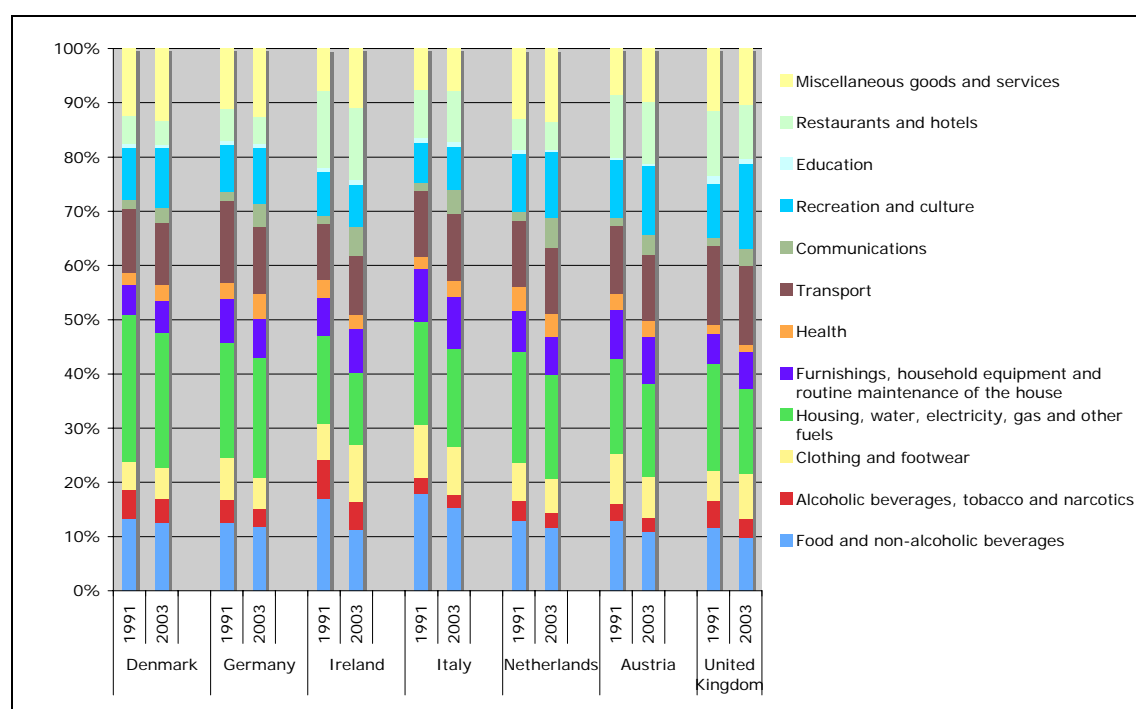
This section shows a global picture of food preferences in Europe and of the main trends expected for the driving forces. It does not discuss the diversity of situations, as European countries still have specificities in terms of food consumption. At the same time, there is a growing homogenisation within EU countries in food consumption<sup>2</sup>. Even the differences between “old” and “new” Member States are reducing, and we see some similar trends appear, such as convenience, out-of-home consumption, health and environmental consciousness<sup>3</sup>.

<sup>2</sup> Rosa 1998 in Buller and Hoggart (2001)

<sup>3</sup> E.g. driving forces for meat and dairy consumption, see European Commission (2004)

### Households

With growing incomes, household total expenditures increased during the 1990's in most EU countries<sup>4</sup>. The share of expenditure on food and non-alcoholic beverages in total expenditure is inversely related to income (Eurostat, 2005). Household expenditures on food increased, but not as much as the total budget. Consequently, the share of household budget spent on food consumption decreased. As an average, the share spent on food and beverage in the EU-15 decreased from 14.7% in 1993 to 12.4% in 2004<sup>5</sup>. Household expenditures shifted from basic needs such as food and clothing to other consumption categories such as leisure, transport, tourism or communications. The trend in decreasing share of household budget spent on food is projected to continue in the future.



Source data: Eurostat data (2004)

**Figure 3. Annual spending on different expenditure categories, selected countries (% total household budget)**

With an increasing number of women in the workforce, the number of double-income households has increased (Michaelis and Lorek, 2004). In the EU-15, the average rate of women between 25 and 54 years old in employment has grown from 60.4% in 1992 to 68.8% in 2004. The same figure was approximately 67% in the new Member States<sup>6</sup>. As women in employment, they have less time to cook – they are still the ones traditionally cooking in the household. Preferences have therefore shifted towards quick and convenient food solutions. With fewer children at charge, women also compensate the lack of time by buying higher quality products (Payer et al., 2000).

Households on low incomes spend a higher share of their budget on food. Income and prices strongly influence their choices in terms of food and diet

<sup>4</sup> Eurostat 2003 NewChronos in Michaelis and Lorek (2004)

<sup>5</sup> Eurostat data (2004)

<sup>6</sup> Eurostat data (2004)

(Michaelis and Lorek, 2004). Expenditures on food have increased in a most EU-25 countries, but the share of budget spent on food and drink is still higher in the new Member States, with 30% in 2000 compared to a range of 10-15% for the EU-15 (EEA, 2005). According to the World Health Organisation (2002), low-income households may spend less on foods that protect health such as fruit and vegetables and relatively more on energy-dense foods (with ingredients including fats and oils, white bread, sugar, soft drinks and fatty meat products) than higher-income households. According to Michaelis and Lorek (2004), the variability in calorie intake in the lower-incomes households is almost entirely due to differences in animal product consumption, which increases with growing incomes.

### *Lifestyle*

Changing lifestyles have become a factor influencing consumption patterns in the EU-15. Time has become a critical factor: time spent on shopping or cooking has decreased (EEA, 2005), as consumers have been prioritising other activities (e.g. leisure) or spending more time in transport for example. In the UK, the trends for convenience are illustrated by the search for “20-minute meal solutions” (Arundel, 2005). This, together with increasing household budgets, has led to a shift to convenient and easy and quick-to-make meal solutions.

Supermarkets have helped change shopping and consumption behaviors (Buller and Hoggart, 2001), by decreasing the number of shopping trips, reducing shopping time (one single shop provides everything) and changing shopping hours. They also provide the wide range of convenient solutions that consumers buy more and more often.

A new habit has also developed in recent years: the so-called “flexi-eating”<sup>7</sup> behavior, which describes less regular mealtimes, skipped meals or the propensity for snacking (more frequent but smaller quantities eaten). This is due largely to people spending increasing times “in transit” (e.g. between home and the workplace), and to less and less time being available for cooking and proper meals.

Out-of-home products and consumption have developed, following fashion and new lifestyles. Eating at restaurants has become popular and more accessible for consumers. Consumers eat also more frequently in cafeterias at school or work. Take-aways and delivery services facilitate the new trend for individualised behaviour (“single life”) and meal improvisation. According to Michaelis and Lorek (2004), 25% of total household food expenditures in the EU-15 go to out-of-home food sources, illustrating that out-of-home consumption accounts for a significant and growing proportion of European food intake.

Immigration will be the main source of population growth in the European Union over the next decade. The continuing influx of immigrants will further change the demographic structure of Europe, adding more multicultural characteristics. With regards to the demand for food, this means a greater demand for products that are commonly consumed in the countries of origin.

Growing numbers of overweight and obese Europeans can be associated with changing lifestyles, with a combination of social trends such as increased sedentary activities and use of motorised transports, consumption of energy dense foods, growing use of snack foods and manufactured foods as well as restaurants and fast food stores, increased frequency of eating occasions (International Obesity Taskforce, 2002). Increasing obesity and overweight affect particularly women and children of

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<sup>7</sup> Datamonitor in Food Navigator Europe

the Mediterranean countries and of Central and Eastern Europe. Obesity is not evenly distributed in Society and greatly affects the less socio-economic favoured (Ibid.). Childhood obesity and overweight has increased steadily over the past decades, with rates in southern European countries such as Italy, Portugal, Greece or Spain between 20 to 35% compared to 10-20% in northern European countries (International Obesity Taskforce, 2003).

Lifestyle driving forces are predicted to continue in the same directions: reduced time budget, more individualised behaviour, increasing flexi-eating and snacking, and strong social influences such as the popularity of eating out or trying new foods. This will be associated with – and probably amplified by – modern ways of shopping: supermarkets, home delivery, e-shopping. These factors will continue the trend towards convenient solutions and out-of-home consumption.

### *Quality*

According to Buller and Hoggart (2001), health and food safety are “food characteristics that have gained enormous relevance in last decade”. Food scares have caused more consumer awareness in terms of food safety and health. Consumption of some foodstuffs has consequently changed:

- Beef meat has seen its popularity decrease: in 1990, 26.2% of meat consumed was bovine, and this percentage decreased to reach 21.5% by 2003 (FAO, 2005). At the same time, consumption shifted towards poultry and pork, supposedly healthier. They are also more frequently used in frozen and ready meals (Michaelis and Lorek, 2004). According to the Network of Independent Agricultural Experts in the CEE Candidate Countries (European Commission, 2004d) a similar trend was observed in EU-15 and in the new Member States. Additionally, a trend for a higher quality in meat “cuts” developed.
- According to Datamonitor (2002)<sup>8</sup>, the number of vegetarian consumers has not increased significantly since the 1990’s, but there has been a new trend for “meat-reducers” behaviours: an increasing number of people choose to reduce their meat consumption, without becoming “full-time vegetarians”. In 2002, 46% of UK population and 46% of Germany population were “meat-reducers”, the highest rates in Europe.
- New labels have been created as consumers are expecting quality, information and traceability, such as the European quality labels PDO (Protected Designation of Origin) and PGI (Protected Geographical Indication)<sup>9</sup>. On the other hand, the Eurobarometer (2004) *European Union citizens and agriculture from 1995 to 2003* showed that most European consumers are not aware of these EU quality labels or are confused.
- The market for organic products has developed significantly since 1990’s and it represents “the fastest growing areas within food and drink sales in Europe as a whole” (EEA, 2005). It is however anticipated that this market will remain as a niche. According to the CONDOR project findings, the high prices of organic products could compromise the further development of the organic market in the future.
- Genetically modified products are still under debate in Europe, as consumers are concerned about the potential consequences on health and the environment.

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<sup>8</sup> Data available on Food Navigator Europe Website

<sup>9</sup> Created under Council Regulation (EC) No 2081/92 of 14 July 1992

According to Eurobarometer (2002) on *Europeans and Biotechnologies*<sup>10</sup>, between 30% and 65% of the EU25 citizens interviewed rejected all the reasons for buying GM foods – including the following hypothesis: less pesticide residues, more environmentally friendly, tasted better, containing less fat, cheaper, or offered in a restaurant. The most persuasive reason for buying GM foods was the health benefit of lower pesticide residues, closely followed by an environmental benefit. In the recent Eurobarometer (2006) on *Risk issues*, when asked to what extent they are worried about genetically modified products in food or drinks, 25% of EU citizens answered “very worried” and 37% “fairly worried”.

- Consumers are also looking for food that provides other benefits than just basic needs: they want quality and health in addition to convenience. Such products are called “functional”. According to the European Food Information Council (EUFIC), functional foods are “foods which are intended to be consumed as part of the normal diet and that contain biologically active components which offer the potential of enhanced health or reduced risk of disease. Examples of functional foods include foods that contain specific minerals, vitamins, fatty acids or dietary fibre, foods with added biologically active substances such as phytochemicals or other antioxidants and probiotics that have live beneficial cultures.”<sup>11</sup>
- Growing concerns about overweight and dieting has led to an increase of the market share for diet products (fat-reduced, light).
- There has also been a shift towards the purchase of fresh food all year round from all over the world (EEA, 2005), but with a tendency to buy pre-cut and washed products (convenience).
- Consumers have increasingly switched to chilled prepared meals, which use fresh ingredients and have therefore more health benefits potential, as opposed to similar frozen products. Between 1996 and 2001, chilled products sales rose by 45%<sup>12</sup>.
- The ageing population is contributing strongly to the trend for healthy products: older adults have higher concerns for health and well-being and are looking for healthier options. With more time available, they prefer buying fresh ingredients that they then cook.

Demands for quality are expected to grow in the future. EEA (2005) foresees a greater focus on food safety concerns (including microbial pathogens, pesticides and other toxic residues, food additives, diseases (animal to human)). This will lead to increasing demand for labelling, traceability and information. Concerns for health will go up as well, with a growing number of Europeans being overweight or obese and looking for health and well-being.

### *Food ethics*

Ethics is another driving force influencing consumer food consumption. Many products are now labelled environmentally-friendly (Michaelis and Lorek, 2004), including non-food products. Ethics have started influencing consumers’ choice for foodstuffs, but their effect on the actual choice has still been limited. According to Datamonitor<sup>13</sup> (2002), the individual benefit is still the main criterion. Once this is

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<sup>10</sup> Cited in Eurostat (2005)

<sup>11</sup> Data available on EUFIC Website

<sup>12</sup> RTS 2003 in Michaelis and Lorek (2004)

<sup>13</sup> Data available on Food Navigator Website

fulfilled though, consumers are increasingly looking for secondary benefits (“The majority of consumers want something that “does me good” but also “does good for someone or something else”.”). Trends for increasing concerns such as animal welfare are expected to continue. January 2006, the European Commission introduced an “Action Plan on the Protection and Welfare of Animals” for the period 2006 – 2010, including the option of introducing a label on animal welfare<sup>14</sup>. There is not a general consensus over the consequences of these concerns in all the studies. Some predict a significant increasing trend towards natural, organic products and meat consumption reduction – sometimes associated with the projection of an increase in vegetarianism, while some other put limits to this increase. Yet, they all share the perspective of an increase – slightly or significant – in this direction.

#### **4. Supply of agricultural products in the EU**

##### **4.1 Land, labor and capital**

Land, labor and capital are the fundamental input factors of agricultural production. During the process of European integration within the EU-15 the capital intensity of agricultural production has increased dramatically, as a result of productivity growth, improved competitiveness and compliance with product quality standards. Use of fertilisers and plant protection products as well as technological progress with respect to machinery equipment and consumption of energy and other resources, such as water, have reduced the dependencies of farmers on natural site characteristics. To cope with the problem of surplus production, regulations on EU-level, financial incentives as well as price trends of agricultural inputs factors have led to an implementation of more extensive agricultural production methods, such as ecological farming or extensive management of grassland (Poiret 2006) but also to a significant increase of set-aside agricultural land, especially in marginal areas.

The agricultural labour market in the EU-15 was characterised by a continuously decreasing employment (Baum 2005), and there has been a progressive substitution of capital for labour. Labour has become increasingly expensive, partly because of the costs associated with social security policy and partly because of increasing employment opportunities outside agriculture. On average the income of agricultural activity is increasing continuously but it still lags behind other economic sectors and marked agricultural income disparities within the European Union could be seen (Barthelemy & Vidal; European Commission 2002, European Communities 2005). In general there is an ongoing trend to substitute labour by capital (European Commission 2002). The EU-enlargement widened the labour market and put pressure on the wages, especially for unskilled agricultural employment (cf. Gerdes 2002) resulting in a trend towards adjustments between the old and the new member states.

##### **4.2 Productivity**

European agriculture (EU-15) is characterised by high productivity levels: a relatively high production level per production factor unit. This is a continuous development fed by new technical knowledge. Transfer of technical capacity to EU-10 is expected. Technical innovations are divided into process innovations and product innovations.

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<sup>14</sup> Press release IP/06/64 (23/01/2006)

Product innovations focus on the improvement of existing products and the development of new ones. With process innovations, the production method occupies the central position. Within the agricultural sector, the process innovations have always had the upper hand, often resulting from product innovations in the supplying industry. For example, artificial fertiliser, new machinery and new greenhouse and stall systems have made new production methods possible. These examples indicate that there is a strong interaction between both types of innovation. One could also say that a product innovation such as a new type of stall comes into being as a result of the need for a different production method (such as low-emission production methods).

Productivity can be increased by producing more with the same means of production and/or by economising on the production factors. In the past, the emphasis was placed mainly on achieving more physical returns per hectare or per animal. More productive initial materials, better feed conversion, more manure, new and more effective pesticides, etc. The focus was therefore more on the use of more external inputs per hectare. Partly in response to the environmental impact, the last few years in some countries there has been a reduction in this trend: the focus has shifted more towards economising on inputs.

A lot of technological innovation is also aimed at reducing the labour costs per product unit, through mechanisation and these days particularly through automation. This is true for the entire industrial column, for example in the distribution and processing industries (slaughterhouses). In many greenhouses and pig and poultry accommodation, the growth conditions are these days completely computer controlled. Only the care of the crops and the harvesting in the greenhouses still require a lot of labour. The next step would appear to be towards autonomisation and robotisation: the development of machines that can carry out numerous crop-related tasks independently. Two types of robots could be expected within the near future:

- Large robots (the size of tractors or combine harvesters) that can carry out numerous crop-related tasks independently. These will in many cases be machines that already exist but that are able to find their way around when weeding, spraying or harvesting with the help of a Global Positioning System (GPS).
- Small robots (ranging in size from large shoe-box size to small refrigerator size), able to carry out crop-related tasks very selectively and in particular patches. With the aid of sensors, these robots are able to make observations and take measurements independently (relating to the soil and the crop) and to interpret this data (with the aid of the necessary software such as crop growth models). On this basis, the robot 'knows' what he has to do to deal with a disease, infestation or weed or to help the crop in the correct manner. For the time being, such 'precision agriculture' will only be of commercial interest for crops with a very high added value.

It goes without saying that the abovementioned technologies will also be combined. For example, the large robots could also make use of plot information collected by satellite. In this way, it becomes possible to observe the state of the crop from space - including certain diseases and infestations. In response to such information, the robot can take the appropriate measures.

Automation and robotisation are also commonplace in livestock production. In cattle farming, for example, the automated milking system has been in use for several years (and mobile versions of the system may soon also be available), and pig farming is expecting an automated weighing and selection system for pigs in the near future.

### 4.3 Environmental technology

The application of technology can result in environmental problems, but technology can also offer the key to the resolution of those problems. After a period of ‘cleaning up afterwards,’ these days there is a much greater focus on technology that can prevent environmental problems. Economics and ecology can go hand in hand, for example regarding economising on scarce resources such as energy and artificial fertiliser. There are three types of environment-technological solutions:

- ‘End-of-pipe’ solutions. Negative effects of the production process are corrected afterwards: discharge water is purified, the air is filtered (or ‘washed’), and the soil is steamed.
- Process-integrated solutions. The occurrence of pollution is prevented or reduced. Examples include biological pest control, precision fertilisation and tailoring the composition of animal feed in order to influence the quantity and composition of the manure.
- System innovations. This involves taking an integrated look at the organisation of production. This can take place at chain level or in combination with other agricultural or non-agricultural sectors. A simple example is the closure of cycles through the mutual use of residual products: making use of waste from the food industry as pig feed; using industrial residual heat and CO<sub>2</sub> from oil refineries in greenhouse horticulture.

Saving energy is important both from an environmental perspective (Kyoto-protocol) and an economic perspective. Within agriculture and horticulture, greenhouse horticulture accounts for a considerable share of the total energy consumption. Solutions are sought in new greenhouse covering materials, for example, which can convert some or all of the incoming sunlight into energy. This can lead to greenhouses producing energy.

Making good use of biomass - an important source of sustainable energy – will grow in importance over the coming years. In France and Germany, for example, this has also taken on major proportions, partly influenced by the EU directive on compulsory mixing. In quantitative terms, wind energy makes only a modest contribution, although there was impressive growth in the 1990s. Wind energy remains of interest because of the general target of an increase to 12% in renewable energy’s share of gross inland consumption in the EU by 2010. In environmental terms, there are high expectations of biotechnology; for example, more efficient plants that require less in the way of inputs or that are optimally suited to specific circumstances; clean plants, of which all the waste is useable; ‘resistant plants,’ resistant to diseases and infestations, thus removing the need for chemical or other forms of pest control. One particularly interesting innovation is the idea to produce vegetable food proteins directly using algae and solar energy (so-called blue biotechnology). Other innovations with such perspective include:

- Bioremediation: the biological breakdown of environmentally harmful substances using bacteria, algae, fungi and yeasts or higher plants, for example. Bacteria have been used in this way for many years in the purification of waste water and in dealing with oil disasters.
- Technology to add value to residual and waste flows.
- Technology (including ICT) to optimise agrolistics.
- Ecogenomics: working towards healthier soil life.

#### 4.4 Product innovations

A number of technological developments are a source of concern for consumers. Biotechnology is a salient example of this. In broader terms, people are concerned about food safety and there is a greater demand for quality guarantees and information regarding production methods. These are therefore important themes where the future prospects of the sector are concerned.

Product innovations take place on a regular basis in horticulture, such as the vine tomato, new colours of sweet peppers, and countless varieties of plants and flowers. In arable farming and livestock production, new products emerge much less frequently, although maize is an interesting example from the not-too-distant past. All sectors strive for improvements in quality. The post-harvest process is also important in this: storage conditions, the effective monitoring of micro-organisms that can cause food to perish and/or give rise to toxicity, and transportation conditions, for example.

The development of new products for the consumer generally takes place in the food industry. Such products are generally aimed at consumers with greater purchasing power. The processing industry has a need for good quality starting materials (standard quality), and then wishes to create the added value itself by making specific products and supporting those products with a whole range of marketing techniques. The strategy currently predominating is one of more advertising and an emotion-focused approach. However, another trend can be seen, towards products promoting health (functional foods): products with functional advantages such as probiotics, fat-substitutes, sweeteners and high-fibre products. These are products that are truly distinctive: a shift from ‘emotional’ to ‘functional benefits.’

Developments in the field of preserving foodstuffs (heating, drying, deep freezing etc.) make it possible to supply high quality products that are highly nutritious, and have a short preparation time. New freeze-drying technology also makes it possible to combine convenience and authentic aromas. This is important for the growing market for convenience food, ready meals and meals consumed outside the home.

Work is also being done on new applications for existing products, such as the processing of starch potatoes into non-food products. Examples include the substitution of products that are based on petroleum (such as bioplastics), and other new ‘bio-based’ materials and products may also appear on the market. The question is whether crops will be developed that are specifically intended for non-food products and energy, or whether it will turn out to be economically more important to use crops partly as food and partly for non-food products: so-called bio-refining.

## 5. Policies

### 5.1 Introduction

With diverse objectives and in different ways, governments are influencing the structure and development of agricultural production, agricultural trade relations and agricultural price and income formation. Typically, agricultural policies are aimed at domestic objectives, though they usually involve repercussions for other countries. Therefore, international co-ordination of agricultural policies is valued highly, but

only achieved with great difficulty. As a matter of fact, the formulation and successive reforms of the Common Agricultural Policy (CAP) of the European Union (EU) offer an interesting example of international co-ordination. The Treaty of Rome, by which six countries set up the European Economic Community (EEC), and which entered into force in 1958, formed the starting point. Article 38 of the Treaty stated the direction for agriculture: free trade within the Common Market. The policymaking process that followed not only addressed the trade concerns of the EU Member States, but also their environmental and health-related concerns.

This chapter highlights the relevant policies of the EU. Other background documents provide more details and discussion. Although general national and regional policies may also be relevant for agricultural development, these will not be described here.

## 5.2 Common Agricultural Policy

According to Article 39 of the Treaty of Rome, the objectives of the CAP are to increase agricultural productivity, to ensure a fair standard of living for the agricultural community, to stabilise markets, to assure the availability of supplies, and to ensure that supplies reach consumers at reasonable prices. Similar objectives are found in countries outside Europe. The CAP was developed to allow the agricultural sector to take part in the Common Market. As a consequence, a great deal of attention was devoted to market and price policy. In practice the central objective was to foster reasonable income formation in agriculture. After a transition period of some years, common guarantee prices for the main agricultural products of the EEC-6 were introduced in 1968. These prices were to be realised by a combination of policy instruments: variable levies on imports, intervention in the domestic market, control of stocks (bought at minimum prices) and variable export subsidies (restitution or refunds).

### *Policy reforms*

Initially, the CAP could be operated with rather low budgetary costs. Over the years however, the CAP became increasingly linked with negative effects such as uncontrollable government expenditure, surpluses of production, market disruption for third countries, and pressures on the environment. In response to this, in recent years several reforms have taken place. In order to respect the tight budgetary ceiling for the EU-25 until 2013, a financial discipline mechanism was introduced.

Also trading partners of the EU called for changes in the CAP. After long and difficult negotiations, the URAA on liberalising agricultural trade was concluded in 1994. The disciplines on domestic support, market access and export support of this agreement have implied rather strict constraints for the operation of the CAP.

Consequently a tendency has developed to adjust the market organisations of the CAP and to provide income support by direct payments. This process started with the Mac Sharry reform of 1992, was followed by the decisions on the Agenda 2000 package made in 1999 (Berlin agreement) and those of the Midterm review of 2003. The result of the subsequent reforms is a policy system with (lower) guarantee prices combined with a single farm payment, independent from production. Limited coupled elements are maintained to avoid abandonment of production. The payment is linked to the respect of environmental, food safety, animal and plant health and animal welfare standards, as well as the requirement to keep all farmland in good agricultural and environmental condition ("cross-compliance").

- To promote a competitive agricultural sector which is capable of exploiting the opportunities existing on world markets without excessive subsidy, while at the same time ensuring a fair standard of living for the agricultural community.
- Promoting production methods which are safe, capable of supplying quality products that meet consumer demand.
- Promoting diversity, reflecting the rich tradition of European food production.
- To maintain vibrant rural communities capable of generating employment opportunities for the rural population.
- Promoting an agricultural sector that is sustainable in environmental terms, contributes to the preservation of natural resources and the natural heritage and maintains the visual amenity of the countryside.
- A simpler, more comprehensible policy which establishes clear dividing lines between the decisions that have to be taken jointly at the EU level and those which should remain in the hands of the Member States.
- To promote an agricultural policy that establishes a clear connection between public support and the range of services which society as a whole receives from the farming community.

**Box 1. Objectives of the CAP, formulated in relation to the Agenda 2000 reforms (EC, 1999)**

*Rural Development Programmes*

Besides price and income policies (“first pillar” of CAP), the EU has developed a rural development policy (“second pillar”). Since the reform of the CAP, this policy is supposed to play an important role in helping rural areas to meet the challenges of the 21st century. The new strategic guidelines for this policy were adopted by the Agricultural Council in February 2006. The guidelines set out a strategic approach and a range of options which Member States could use in their national Rural Development programmes. The regulation broadens the possibilities to use Rural Development funding to boost growth and create jobs in rural areas – in line with the Lisbon Strategy – and to improve sustainability, in line with the Göteborg sustainability goals. The future Rural Development policy 2007-2013 will focus on three areas in line with the “three axes” of measures laid down in the new rural development regulation: improving competitiveness for farming and forestry; environment and countryside; improving quality of life and diversification of the rural economy. A fourth axis based on experience with the Leader programme introduces possibilities for locally based bottom-up approaches to rural development.

5.3 Environment, food safety and animal welfare

Within the framework of the European integration process, more and more government policy matters have been transferred to Brussels over recent decades, thus making national governments primarily responsible for the implementation of that European policy.

In the field of the environment, the policies concerned are the Nitrate Directive, the Directive establishing a framework for Community action in the field of water policy and - for the larger intensive livestock farms - the Integrated Pollution Prevention and Control Directive (IPPC). The authorisation of the use of pesticides is increasingly becoming harmonised within a European context. In the field of veterinary science, stricter European rules on matters like the transportation of animals and the use of meat meal have been put in place since the BSE (mad cow disease), swine fever and foot-and-mouth disease crises.

A number of regulations have also been introduced regarding animal welfare. For example, since 2004, there has been a ban on individual box stalls for veal calves, and the keeping of laying hens in battery cages will be banned in 2012.

With regard to food safety, the EU has designed new legislation: the General Food Law. Within the member states, the implementation of this leads to changes in the control over the supply chains and new organisational and financial relationships.

As long as they are respected, most of these rules have a harmonizing effect on the competition conditions (a 'level playing field'). In addition, they result in costs that can vary by holding and member state, depending on the starting position. For example, the Nitrate Directive has much greater repercussions for countries with high concentration of livestock farms than for countries with a very low concentration of these farms. The same applies to the crop protection policy, as some countries grow a relatively large number of crops requiring above-average use of pesticides. A ban on such pesticides or a limitation of their use would have much more drastic consequences than in other countries.

## **6. Research issues**

### 6.1 Introduction

In this chapter we will reflect on research issues with respect to agricultural development and government policies. Our reflections are taken from Petit (2004), who dealt with the intriguing question “How to manage the globalisation of agri-food markets”.

The argument is often heard that private market participants (producers and consumers) would reach acceptable solutions without public intervention, i.e. with a radical liberalisation of agricultural policies. However, scepticism about the satisfactory functioning of free market forces in agriculture is appropriate. According to Petit, the process of globalisation has positive consequences, which explains why governments have generally supported the process of international liberalisation of agri-food markets. But some of the consequences of that globalisation are negative and they raise serious concerns, particularly because globalisation entails a reduction of the effectiveness of national government interventions and, as a result, a reduction of their ability to cope with these negative consequences.

In his paper, Petit focuses on four market failures: potential abuse of market power, externalities (societal concerns regarding food safety, the environment, landscapes, and animal welfare), price instability, and issues of equity and distribution. These issues are summarised in the next sections.

### 6.2 Price fluctuations<sup>15</sup>

Due to the reforms to the EU's agricultural policy, greater price fluctuations can be expected for a number of products. We have already seen this in the case of beef (for which prices fell to very low levels for a number of years following the BSE crisis) and grain (due to lower harvests, for example in the drought year of 2003). Over the coming years, a similar situation could also arise for dairy products and sugar, particularly if the quota restrictions are lifted and the production volume becomes

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<sup>15</sup> The analysis of recent price fluctuations is taken from Silvis & De Bont (2005).

more variable. The latter will apply particularly to beet sugar for which growers can decide on their production volume on an annual basis. With regard to price changes on the world markets, the way that the large countries manifest themselves will be particularly important. Will demand from China increase as strongly as predicted? Will Russia remain a net importer? Can Brazil and other exporting countries meet the growing global demand? Climatic factors (such as drought and floods) can bring about unexpected price fluctuations. For animal products, outbreaks of animal diseases can suddenly result in extra price movements, such as was the case for eggs as a result of the fowl plague in 2003. It is important for the European market that the variable import levies have now made way for fixed (and declining) tariffs, and that the exchange rate between the dollar and the euro can change considerably over time.

Price instability has long been recognised as a major characteristic of agricultural and other commodity markets, Petit explains. For a long time, economists emphasised that price instability had very negative consequences for both producers and consumers, in the short and in the long run and from both a static and a dynamic perspective, as instability was perceived as slowing down the adoption of innovations as well as leading to periods of hardships because of scarcities followed by wastes due to gluts. In the case of agriculture, the primary source of instability being natural and not man-made, policy interventions which would be able to reduce price instability were hence seen as very desirable. This view has changed dramatically in recent decades, mainly because past efforts at stabilizing prices have failed and/or have had unintended and unforeseen negative consequences. The majority of public interventions took place at the national level. These include government interventions on the markets for agricultural products, government purchases and storage, stock disposals sometimes through subsidised exports, sometimes through straightforward destructions of stocks. The main problem with these interventions is that governments have often not been able to resist political pressures to set intervention prices above the trend level. The price stabilisation policy becomes then one of price support, resulting in the accumulation of surpluses and escalating budget costs which can become unbearable. In addition, the international consequences of these domestic policies are often negative and significant: flooding of the international market with subsidised exports, loss of domestic competitiveness, dumping of food aid. Thus, efforts to stabilise domestic prices have added to price instability on international markets. Efforts to stabilise prices at the international level have been even less successful than domestic price stabilisation schemes. In the academic and in the policy communities there is a broad consensus that public intervention to stabilise international prices has failed. This explains the renewed favor for private stabilisation instruments: insurance schemes and futures and options markets. However, the use of these private instruments to cope with market risks resulting from instable international markets remains very limited. In the view of Petit we are here in a situation of joint market and government failure. Not being confident about private market solutions, he makes the case for public intervention at the international level.

### 6.3 Market power<sup>16</sup>

Due to further technological changes (ICT, genetic engineering), the agri-food sector of the future will be characterised by more direct linkages between supply chain

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<sup>16</sup> The first part of this section is based on notes by Frank Bunte (LEI).

actors. The 'invisible' hand of spot market arrangements is increasingly replaced by the 'visible' hand of explicit and implicit contracts, vertical integrations, strategic alliances, et cetera. However, for outsiders (researchers, society and government), the supply chain may very well become less visible (transparent). Transactions within the supply chain will be governed within multinationals and through contracts, strategic alliances, et cetera. Direct contact supposedly facilitates information exchange within supply chains. Distrust in big enterprise may remain important despite attempts to 'guarantee' transparency and corporate social responsibility.

Food net-chains will tailor food supply to consumer preferences, as far as is possible. Net-chains produce the varieties individual consumers want and distribute these varieties where and when consumers want them (e.g. home delivery based on information technology).

For agribusiness firms information is a crucial competitive factor. Those net-chains which are best able to meet consumer demand have a comparative advantage over competing net-chains. Within a net-chain, firms with superior information on consumer preferences - and physical access to consumers - have a comparative advantage over their supply chain 'partners'. These firms will govern the supply chain. The comparative advantage is based on information on consumer preferences (scanning and related information rather than tracking-and-tracing). The crucial questions are: what are the food varieties consumers want? Where and when do consumers want food (and other products) to be delivered? Who controls access to consumers both in terms of information and in terms of delivery?

For economists, the existence of market power is one of the main market failures that need to be corrected by government action. According to Petit (2004), in recent years the European Commission's General Directorate for Competition, has become a powerful check on business concentration. And in the United States, the Department of Justice has become very aggressive in the fight against international cartels. Thus these two agencies somewhat specialise in one of the two main policy instruments which have been invented: a posteriori punishments, through fines and imprisonment, of those who abused their market power through illicit collusion and price rigging and a priori regulation of mergers to prevent the emergence of monopolies. Serious examples are found in the concentration in industries supplying food and animal feed ingredients.

Another concern is related to the concentration in the food distribution sector. This is true both within individual countries and through the emergence of truly multinational food distribution chains established in more and more countries. In a country such as France, the main issue is the monopsony power of the large distribution chains having sometimes their joint purchasing agencies. Farmers and their organisations are very concerned that they are the victims of the market power of these large firms. But for final consumers, Petit argues, the risk that concentration in the food sector could lead to restrictions in the availability of food products available seems of no political relevance.

#### 6.4 Externalities

Societal concerns for the environment, for food safety and even for animal welfare are widely shared, particularly in rich countries, and have become the sources of powerful political forces (Petit, 2004). Many food safety and environment concerns are site-specific and they correspond to problems which existed before the globalisation of

agri-food markets. But they often entail major externalities, which limit the social efficiency of market mechanisms. Classically, economists distinguish between positive and negative externalities. The “production” of attractive landscapes by wise agricultural practices is an example of the former, which may legitimise public support to farmers for the production of this public good in direct recognition of the multifunctional character of agriculture. European agriculture has always had an important role as co-producer of wide range of public goods and as manager of these goods. There are however no or poorly functioning markets for these public goods and services (Durand, 2006, Legg, 2006). But most issues arise, Petit argues, because of the existence of many negative externalities. Examples that he presents, relate to the access to and use of genetic resources, and the controversy on genetically modified organisms (GMOs).

## 6.5 Equity

It is well known, Petit (2004) argues, that the globalisation process is favourable to those who can take advantage of the opportunities it offers but that it accentuates the process of marginalisation of the weakest and poorest, who lack the human and financial resources to adjust. So, the globalisation of agri-food markets, like other aspects of the whole process, raises major equity issues. It is very troubling, to say the least, that some 800 million people do not have sufficient access to food today and that the reduction in that number since the World Food summit in 1996 is very slow at best. Hunger on such a scale is indeed a gigantic global failure of markets and governments together.

Another equity issue, of a very different nature, is directly linked to the liberalisation process: should losers be compensated? How feasible is such compensation? In this case, the situation is more complex than for the issues discussed so far because governments are on both sides of the issue: they are actors promoting the liberalisation process itself, through their active involvement trade liberalisation negotiations, and as members of the IMF and the World Bank, they have been behind the liberalisation agenda pursued by these institutions. At the same time, governments commonly try to resist full trade liberalisation in order to soften the blow on potential losers within their jurisdiction. This is particularly the case for agriculture in developed countries.

## 7. Conclusions and recommendations

### 7.1 Introduction

In order to optimally contribute to the needs of the society, European agriculture faces many challenges. The sector is asked to perform as an economic sector that is versatile, sustainable, competitive and spread throughout Europe, including the less favoured and mountainous regions. It should also be capable of maintaining the countryside, conserving nature and make a key contribution to the vitality of rural life, and able to respond to consumer concerns and demands regarding food quality and safety, environmental protection and the safeguarding of animal welfare.

This is not the place to discuss the extent to which all these societal demands can be met in real life. Instead, this final section formulates the main conclusions on

the driving forces of European agriculture. In connection to these conclusions, also some reflections on and recommendations for policy research are presented.

## 7.2 External factors

The development of European agriculture is driven by numerous factors. For promoting sustainable development of the sector, it is useful to distinguish exogenous factors from endogenous factors. Exogenous factors are beyond the direct control of the European policymakers, such as climate change and developments in global markets, macroeconomic growth, demographic movements, changing consumer preferences, environmental pressures, structural change in agribusiness, energy scarcity and developments in science and technology. It is the combined effects of these factors that raise societal concerns with respect to the development of agriculture.

Among the concerns in relation to the physical environment, the climate change and the negative environmental impacts of agriculture should be noted first. In connection to the consumption and demand of biomass and agriculture-related public goods, relevant issues are the adequate delivery of food quality, safety and traceability, production of bioenergy instead of food and the multifunctional nature of agricultural production. Major changes in the socio-demographic structure are the depopulation of less favoured areas (LFA), the ageing of farmers as well as other population and the migration trends within and from outside the EU.

As far as global markets are concerned, OECD en FAO have noted that the location of world agricultural market expansion is shifting increasingly towards developing countries (Brazil, India, China). In their baseline scenario they present rather stable prices. However, it is acknowledged that this scenario is surrounded by major uncertainties, such as weather-related production shocks, animal diseases, energy price trends, investment in bio-fuel capacity, economic growth prospects and future agricultural policy developments.

## 7.3 Policies and research

Endogenous factors are formed by the political decisions with respect to policy measures. These measures may be viewed as a series of deliberate choices for enhancing the sustainable development of the sector. Relevant examples for agriculture are: environmental standards, setting of product prices, providing direct payments, investment subsidies, budget and financing, enlargement and trade agreements. Important criteria for rational policies are their effectiveness and efficiency. In practice, considerations of equity and distribution may even play a more fundamental role.

From an institutional point of view, several factors influence the operational environment of agricultural policy-making. Most important of these are: international trade negotiations (WTO), EU's financial framework, governance structure, enlargements, and the general belief in the fruits of further market orientation of policies.

As was argued in chapter 6, scepticism is due with regard to the satisfactory functioning of free market forces in agriculture. The process of globalisation not only has positive consequences, but also negative ones. This gives serious concerns, because globalisation entails a reduction of the ability of governments to cope with these negative consequences. Four issues have been put forward: price instability,

potential abuse of market power, externalities (societal concerns regarding food safety, the environment, landscapes, and animal welfare), and issues of equity and distribution. Those issues should be on the agenda of both policymaking and research.

#### 7.4 Recommendations

Contrary to popular assumptions, the agricultural sector is not synonymous with the rural economy. Since the last decade, it has become increasingly apparent that agriculture in many rural areas is not the principal economic driver. The patterns of change of agricultural production and rural economies are becoming increasingly complex. Coherence of policies requires a degree of coordination that is creating new challenges to political bodies for achieving policy objectives at the territorial level. Meeting this challenge depends on an understanding of what are the independent and dependent variables in the development, and how these variables relate to each other.

It is a challenging task for policy research to assess the variables that agricultural and rural policies have to take into account, and to give insight in the available options and their likely consequences. Important topics in this respect are global agricultural markets, natural and social constraints on land use, rural demographic patterns and agricultural technology. These primary variables are influenced by social and economic factors, which are both conditioned by technology. Technology determines what is possible and social demand determines what is economically viable. Social demand does not only reflect demand for food, but also environmental and health concerns. This also includes the commitment of the society as a whole to the wise use of natural resources (water, soil, air) and biodiversity preservation.

The empirical requirements of policymaking are instruments with which processes can be influenced. To obtain these, knowledge of causal relationships is needed, in the sense of connections between actions and effects. Such relationships are generally defined in theories. If the policy-oriented research takes its pretensions seriously, it is necessary to develop and assess theories regarding causal relationships. Research methods that give the greatest possible chance of achieving such results focus on generalisations of specific experiences. For this, precise and adequate empirical descriptions are needed.

Descriptions are based on concepts and data. In respect to agriculture there is a lack of comparable data across the regions of the EU. Below NUTS 2 level there are no comparable data available. It should also be remarked that information on the impacts of applied policy measures is lacking. The lack of data and information relates to environmental, economic as well as social impacts. This does not mean that all research resources should now be put into monitoring and ex post evaluations. Even more important are sound ex ante evaluations, which should provide guidance for future policies.

Modelling is considered to be a crucial line of research, because it makes comparisons among regions and countries easier and offers a cost-efficient way to assess outcomes of alternative future policies. Interfaces between different models should be developed in order to attain a more complete view of likely and possible outcomes of applied policy measures. However, there are also many issues which cannot be properly examined through modelling. Models seem to be applicable where impacts of policies are assessed and compared, but it is also important to investigate the functioning of the policy process itself.

A topic of special interest for both researchers and policy makers is the way in which research results actually contribute to policy decisions. It is worthwhile to investigate if - and in that case how - research models and scenario studies that were paid for by the European Commission are used in policy development. The impression among scientists is that research funded by the EU often has no influence on policy development. This raises several questions. Is this a general problem, what are the reasons for it and what can be done to limit the waste of resources? The solution may not be simple. On the one hand, to be effective in policymaking, there should be frequent interaction between researchers and policymakers. On the other hand, researchers should also interact with each other and with society at large, as their task is not only to help finding socio-technical solutions in the implementation of policies, but also to contribute to setting the policy agenda.

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