

Econometric modelling of the EU agri-food sector through co-operation with partners in the EU-AG-MEMOD Project.

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Summary

This research project set out to build an EU agricultural policy modelling system involving participants from right across the enlarged EU. Policy Analysis is conducted at an aggregate commodity level for the main sectors of EU agriculture. The work summarised here took place over the period 2001 to 2004.

The implementation of the Luxembourg Agreement and the Enlargement of the EU will lead to significant changes to the way in which agriculture operates in the EU25. Under the reform, direct payments that have been linked to production are to be decoupled to varying degrees across the Union. Enlargement will mean that agriculture in several New Member States (NMS) will come under the EU system of payments, supply constraints and market price supports for the first time. In light of the above, the most common current approach to agriculture commodity modelling and policy analysis - that which treats the entire EU as a single entity - faces a considerable challenge.

Given the heterogeneity of EU agriculture and agricultural policy across the enlarged EU, it is increasingly the case that 'the devil is in the detail'. From a scientific perspective, country level policy analysis is important in order to capture the consequences of this heterogeneity. Moreover, at a political level, policy makers realise that policy proposals either sink or swim on the basis of the perception of their expected future impact at a national level. Hence, it is important to be able to inform and facilitate a debate on the relative merits of particular reform proposals by having national (or even sub-national) level analysis to hand.

The case for national level modelling across the EU is easily made, but few practitioners have taken up the challenge it presents.¹ Key problems include funding constraints, the absence of reliable national data sources, difficulties in agreeing and co-ordinating a consistent modelling approach and, perhaps most importantly, the absence of an integrated network of economists with knowledge of local level agriculture and agricultural policy across the enlarged EU.

Objectives

The aim of this project is to improve information support for decision making at all levels by mobilising and integrating EU Member states' capacities for forward looking analysis. The prime application is in the estimation of the potential impact of policy change proposals on agriculture and food markets. The model based projections are made by economists based in the country of analysis and therefore reflect local knowledge which can improve projections for EU and global markets. Gains will flow from the embedding of the model for the Irish agri-food sector in this EU-wide system and from the leading involvement of the Irish team in this research and associated co-working with colleagues across the EU.

In this report we present the results for the EU-15 and Central and Eastern European Countries (CEEC) of a simulation of the Luxembourg CAP reform based on the AG-MEMOD composite model. This dynamic partial equilibrium econometric multi products model comprises of national country level sub-models that are combined; generating projections for each country, and the entire EU, for each year to a 10-year horizon.

Under the Luxembourg reform scenario simulated direct payments in the grains and oilseeds, cattle and beef, and sheep commodity market organisations are fully decoupled. Intervention price reductions for butter agreed as part of the reform are also considered. The impact of the Luxembourg Agreement reform scenario is measured against a Baseline of a continuation of Agenda 2000 agricultural policy.

The challenges faced in building agricultural policy models for economies, which have only recently completed the transition to a market basis, are described, along with some illustrative examples of key results. The development of these models for the NMS is a step towards their integration, on a more formal basis, with sister models developed for the EU15 Member States.

Methodology

A series of interlinked economic models capable of projecting key price and output variables were built for the main EU agricultural commodities and these in turn were linked with projections for world prices. It was thus possible to estimate the implications at EU Member State level of the effect of policy changes on the supply, demand, trade and price of agricultural commodities.

Key Findings

EU15

- Our results indicate that, relative to a Baseline of no policy change, the CAP reform scenario analysed causes area harvested and production of the main EU cereals crops to decline by an average of less than 2%.
- Barley area harvested declines by the greatest extent, with area harvested projected to decline by over 4%.
- The impact of the decoupling of direct payments from animal production is greater than in the arable sector.
- With the full decoupling of direct payments from animal production, EU suckler cow numbers would decline by over 5% by 2010 relative to their Baseline level, while EU ewe inventories are projected to decline by approximately 4%.
- Lamb and beef production declines in line with the decline in inventories of breeding animals.
- Under the scenario the EU becomes a significant net importer of beef : this represents a significant change from the Baseline position where the EU is only a marginal net importer of beef.

CEEC

- The overall Baseline outlook suggests generally positive trends in production for the NMS. There is a re-orientation towards crop production and the NMS greatly reduce their net grain import requirement.
- For the most part, Baseline livestock production experiences only modest growth and production levels are comparable with those achieved in the pre-transition period.
- For some products, notably beef and maize, there is an improvement in the net trade position under the Baseline such that the NMS become net exporters of these commodities. The most positive growth production trends would occur in the Baltic States, Slovakia, the Czech Republic and Poland. Production prospects across several sectors in Hungary are generally less favourable.
- The CEEC become net importers of broiler meat in the Baseline projection period due to the projected reduction in broiler production in Hungary.
- Under the Accession Scenario, the NMS gain in particular from higher prices and budgetary support in some sectors (industrial crops, beef). Accession supports the orientation towards crop production and the NMS become net exporters of grains.
- Projections under Accession for most sectors show real increases when measured against recent production levels, but these projections should also be compared with historical production levels achieved in the late 1980s and early 1990s.
- For the most part CEEC livestock production benefits from Accession, with beef and pig meat being the meat sectors most likely to exhibit appreciable growth, driven by the higher post-Accession prices.
- Production growth in the dairy sectors of the CEEC is more limited under the Accession Scenario than under the Baseline, since the sector is subject to production quotas.

1 Introduction

The AGMEMOD Partnership model is an econometric, dynamic, multi-product partial equilibrium model that allows us to make projections and simulations in order to evaluate measures, programmes and policies at the European Union level as well as at the Member State level.

The project began initially with fourteen teams as members of the AG-MEMOD Partnership, who set out to build compatible models for their own countries (all partner institutions are listed in an Appendix to this report). These models account for over 99% of the agricultural output of the EU15. The diverse nature of agricultural production systems and agri-food markets across the EU poses a challenge to economists seeking to develop a model that can be used to analyse policy at an EU and Member State level. The AG-MEMOD Partnership model maintains the analytical consistency of the composite model across national sub-models, while still allowing the national sub-models to reflect the intrinsic diversity of the agri-food sectors in different EU member states (Donnellan, Hanrahan, McQuinn and Riordan, 2002).

Subsequently the project was expanded to include the analysis of agricultural policy changes for Central and Eastern Europe Countries (CEEC) taking place under EU Accession. Ten teams, drawn from institutes across the CEEC and working as part of the AG-MEMOD Partnership, have built compatible models for the agriculture sector in each of their countries. These models account for over three quarters of the agricultural output of the countries that acceded to the EU on May 1st 2004. In addition, there is also coverage of agricultural production in Romania and Bulgaria, the next countries in line to join the EU.

The purpose of the Partnership is to conduct analysis of the implications of policy changes for EU agriculture over a ten-year time horizon. A large number of national level reports have also been produced by other countries involved in the partnership (further details of the national level models are available from www.agmemod.org).

This report contains the results of the Baseline (the no policy change outlook) for the EU agriculture sectors and examines the potential implications of:

- CAP reform under the Luxembourg Agreement
- The introduction of the Single Payments System in the CEEC and the eventual move towards harmonisation in payment with the EU15.

What is a Baseline?

In this project, policy analysis is conducted by producing a Baseline - essentially a projection of the future - based on policies currently in existence or agreed to come into existence. This Baseline outcome is then contrasted with the projected outcome of a change in policy. In this way, it is possible to gauge the potential effect of the change in policy.

Over the last 20 years, FAPRI (the Food and Agriculture Policy Research Institute) in the US have developed an extensive set of agriculture models for specific commodities. As part of its Annual Outlook on World Agriculture, FAPRI uses these models to provide projections for the Baseline scenario at a global level and for component regions, including the EU, for each year over the next decade. This project is indebted to FAPRI for facilitating the partners involved in the AG-MEMOD Partnership by providing guidance in the implementation of the FAPRI methodology and also for the use of its international price projections in the models.

Given that a significant portion of EU agricultural output is exported, and that expenditures on export subsidies are in decline, conditions in world markets will exert an increasing influence on the outlook for EU agriculture. The world dimension provided by the link between the work in this project and the work taking place at FAPRI in the US is therefore imperative.

A Note on Interpretation

Forecasting and policy analysis for commodity markets is a bit like taking aim at a moving target. The environment in which this analysis is conducted is constantly evolving. Changing macroeconomic and market supply and demand conditions can influence the effect of policy and the results of the analysis. Over time, the outlook for a commodity may change as new information is incorporated into the analysis. Projections for the outcome in future years may therefore differ in successive analyses.

Methodology

As noted above, the AG-MEMOD country models are econometric, dynamic, multi-product, partial equilibrium commodity models. As a multi-product modelling system, the model is well suited to

reflecting the supply and demand interrelationships among agricultural products (as exemplified by the beef and grains/feed relationship). Behavioural relationships reflecting supply and demand responses can be built in. Another attraction of this model type is the flexibility it offers to incorporate exogenous variables such as technical change, population growth, income and consumer preference trends.

Partners have built their models using a common framework that has facilitated their aggregation to provide results for the EU15 and CEEC. The aim of the modelling teams was to provide as wide a level of commodity coverage as feasible, given the data that are available. Coverage includes grains (soft wheat, barley, maize, rye, oats and durum wheat), oils (rapeseed, sunflower seed and soya), livestock (cattle, pigs, poultry and, where relevant, sheep & goats) and livestock products (milk, cheese, butter, skimmed milk powder and whole milk powder).

One of the key challenges that arose for the modellers was trying to assemble a coherent and consistent set of data for each commodity, in each of the countries modelled. The political and economic changes that many of these countries have undergone in the last 10 to 15 years (Swinnen, 2000) mean that it is often practical, reasonable and meaningful to constrain the data coverage period to relatively recent years. Additionally, the compilation of statistics in the CEEC has only recently come under the aegis of EUROSTAT, so the lack of common definitions and reporting standards in the compilation of historical data is a particular difficulty in some countries. The annual data used were obtained from national statistics, national academic and trans-national databases such as New-Cronos, OECD databases and FAPRI forecasts.

The estimation of the model parameters follows the general rules provided for in the AG-MEMOD modelling approach (Hanrahan, 2001). However, for some countries, particularly the CEEC, due to data inconsistency and structural breaks in policy, calibration techniques were used (see Dawkins, C., Srinivasan, and Whalley for a comprehensive review of the use of calibration in the context of model building). The econometric approach is generally used to give the initial values for the regression coefficient used in the models. Most of the equations in the model are estimated using annual data over an estimation period where data are deemed relevant or over shorter periods when data are not available. The model produces projections of production, consumption, exports, imports, stocks and prices.

For a comprehensive description of the structure of AGMEMOD type models see Chantreuil, Levert and Hanrahan (2005).

2 The AGMEMOD Baseline and Scenario for the EU15

2.1 Description of the baseline scenario

In this section we describe the agricultural policies that characterise the Baseline and provide a short summary of the macroeconomic outlook that underlies the projections of the AG-MEMOD composite models. The origin of the world market price projections used under the Baseline and the Luxembourg scenario are also outlined.

The Baseline policy incorporates the Agenda 2000 reforms of the CAP. The Baseline does not make assumptions concerning the outcome of the Doha Development Round of the WTO. The Uruguay Round Agreement on Agriculture (URAA) is assumed to prevail for the whole of the projection period. In the current EU-15 Baseline, the Accession of the EU-10 group on the 1st of May 2004 is not incorporated. In future policy scenarios analysed with the composite AG-MEMOD model such WTO and EU enlargement assumptions will be relaxed.

The macroeconomic outlook incorporated in this Baseline is based on external sources such as macroeconomic institutes in Member States and the FAPRI-Ireland Partnership. World market price projections are not endogenous to the AG-MEMOD model. However, the AG-MEMOD model is linked to the FAPRI-Missouri EU GOLD model (Hanrahan, 2001). This model incorporates world price projections from the FAPRI world agricultural modelling system and allows for the incorporation of the impact of global supply and demand developments on EU agricultural markets. The world market price projections used in both the Baseline and scenario analysis presented below are taken from the most recent FAPRI-Ireland Baseline publication (Binfield et al., 2003).

2.2 Baseline Results

Under the AG-MEMOD Baseline EU grain prices are expected to decline over the projection period. With the exception of the durum wheat price, which is expected to fall by 28% to 104 €/tonne in 2010, the declines in grain prices that are projected under the Baseline follow the price spikes observed in 2002. Soft wheat, barley and maize prices are projected to decrease by 7%, 9% and 9% respectively over the period to 2010.

With EU grain prices projected to decline over the period 2002-2010 and arable aid payments fixed at levels agreed under Agenda 2000, total EU-15 grains area harvested is projected to marginally decrease to approximately 31 million hectares by 2010. Within the cereals sector EU barley area is projected to decrease by 4%, other crops area is projected to increase slightly over the projection period with wheat area increasing by less than 1% and maize increasing by 1.5%.

Under the Baseline, yields per hectare of wheat, barley and maize are projected to increase by 8%, 6% and 7% respectively by 2010. The combination of developments in grain area harvested and yields leads to increases in EU production of grain. Production of wheat, barley and maize are projected to increase by 6% under the Baseline. The large majority of this increase is accounted for by projected growth in EU soft wheat production.

On the demand side, domestic use, under the Baseline, is projected to increase by 3% over the projection period to over 181 million tonnes by 2010. The majority of this increase in domestic use of grains is due to increased wheat domestic use, which accounts for more than 90% of the increase in total grains domestic use.

The projected changes in EU grain production and domestic use are not expected to lead to changes in the status of the EU as a net exporter of wheat and barley. Under the Baseline net exports of these commodities are projected to increase. EU net imports of maize are projected to decline under the Baseline.

Under the Baseline total oilseeds area harvested is projected to increase by 3% over the projection period. Though total oilseeds area increases, at the level of individual oilseed cultures the results are more diverse. Sunflower seed area harvested is, under the Baseline, projected to decline by 11% over the projection period: by contrast rapeseed and soybean areas harvested are projected to increase by 5% and 41% respectively.

With Baseline EU rapeseed, soybean and sunflower seed yields per hectare projected to increase by 19%, 16% and 8% respectively, total EU oilseeds production is projected to increase to over 20 million tonnes by 2010. This increase in production amounts to an increase of 23% over the projection period.

Crush demand for oilseeds represents the main component of oilseeds domestic use. Under the Baseline, crush demand for oilseeds is projected to increase by 12%. As a direct consequence of increased crushing of oilseeds, EU production of oilseed meals and oils is projected to increase by 11% and 15% respectively. The Baseline projections for the EU net-trade status in oilseeds are for the EU to remain a net exporter of rapeseed and a net importer of soybean and sunflower seed.

Under the Baseline, EU livestock supply is projected to be characterized by a drop in cattle and pigs inventories (13% and 11%), while sheep ending stocks are projected to increase by 10% over the period to 2010.

Under a continuation of Agenda 2000 agricultural policy the EU cattle price is expected to decline by 8% to 256 Euro per 100 kg by 2010. The EU pig meat price is projected to increase by 4% over the period considered, while the EU sheep meat price is expected to decrease by 4% by 2010.

With the projected price developments, as presented in Figure 6, and the continuing link between production and direct payments in the EU livestock sector, EU pig meat production is projected to increase by 6% over the period to 2010, while EU domestic consumption is projected to increase by 8%. EU Lamb meat production is projected to remain relatively constant over the projection period while lamb meat consumption, under the Baseline, is expected to increase by 7%. Due largely to heavier slaughter weights, EU beef and veal production is projected to increase by 1% under the Baseline, while total domestic consumption should increase by 2%. Finally, Baseline EU poultry production is expected to increase by 6% over the projection period, and EU poultry domestic use increases by 14%.

Under the Baseline of continued Agenda 2000 policy the EU dairy sector is projected to be characterised by reductions in the milk price reflecting the decreases in the intervention prices of dairy commodities that were agreed as part of Agenda 2000. Butter and skim milk powder prices are projected to decrease by 18% and 11% respectively, while cheese price is projected to increase by 2% over the period considered. Table 1 presents details of the EU price for the key dairy commodities for the period 2002 to 2010.

The number of dairy cows in the EU is projected to decline by 6% to approximately 20 million head by 2010. This reduction in dairy cow numbers, given developments projected for milk yields, translates into a marginal 0.1% decrease in milk production. Cheese production is projected under the Baseline to increase by 4% while butter production is expected to decline by 2%. These developments on the supply side are projected to occur in tandem with a 10% rise in cheese domestic use and a 1% domestic use of butter over the period considered. Finally, skim milk powder (SMP)

production is projected to decrease by 17% while EU domestic use of SMP is expected to decline by 24%.

Table 1: Baseline dairy product, prices in euro per tonne

	2002	2005	2010
Butter	317	303	274
Cheese	460	465	471
SMP	204	194	181

Source: AG-MEMOD Composite Model 2004.

2.3 CAP reform Scenario- the effects of the Luxembourg Agreement

2.3.1 Description of CAP reforms in the Luxembourg Agreement

The policy reforms examined are those contained in the Presidency compromise document (Council of the European Union, 2003). The macroeconomic environment under the Luxembourg Agreement scenario is the same as that pertaining under the Baseline.

Under the Luxembourg Agreement and the negotiations that have followed, a very wide set of possible implementation scenarios can be envisaged. What is examined here, however, is the most extreme implementation scenario allowed under the Luxembourg Agreement, i.e. all direct payments under the Agenda 2000 Common Agricultural Policy (CAP) are fully decoupled at the earliest possible date. At the time the analysis was conducted the implementation plans of all Member States were not known. Member State choices, vis-à-vis the implementation of the Luxembourg Agreement, have now been notified to the European Commission. In most instances these plans deviate from the maximum decoupling scenario analysed here. The analysis presented below serves primarily to illustrate the analytical capacity of the AG-MEMOD model rather than representing an analysis of the consequences of the Luxembourg Agreement as implemented by the different Member States of the EU.

The Luxembourg Agreement changes the CAP as it applies to livestock, cereals and oilseeds and the dairy sector. Under the Luxembourg Agreement scenario analysed here all direct payments are decoupled from production from January 2005. In the beef sector the suckler cow, special beef, and slaughter premiums are all decoupled from production. In the sheep sector the ewe premium is fully decoupled. In the cereals and oilseeds regime arable aid payments are decoupled from production. In the dairy sector a reduction in the butter intervention price of 10% will take place. This is in addition to the intervention price reductions agreed under Agenda 2000. These intervention price reductions are also brought forward to the 2004/05 production year. The dairy compensation premiums agreed under Agenda 2000 are also further augmented to compensate for the reduction in the intervention price for butter. These compensation payments from 2005 are fully decoupled from production. The milk quota regime, under the Luxembourg Agreement, is to continue until 2014/15.

In this policy reform simulation with the AG-MEMOD composite model, the impacts of the introduction of the single farm payment are captured by reducing the supply inducing effect of payments to 30 per cent of their level under the Baseline. Thus, in the analysis presented below, the “decoupled” payments retain some of their production inducing effect. This assumption firstly reflects the fact that payments are still tied to land, i.e. farmers must remain farmers, and secondly reflects the likelihood that the receipt of the single farm payment will, by reducing the income variability of farmers, influence their production behaviour, with regard to risk for example. Hennessy (1998) presents the theoretical basis for this latter argument concerning the impact of decoupled income payments on producer decisions in a world characterised by the presence of risk. Adams et al. (2001) present empirical evidence on the degree to which decoupled payments in the US affected producer decisions. No attempt has been made to incorporate the cross-compliance or modulation elements of the Luxembourg Agreement in the AG-MEMOD Partnership modelling system.

2.3.2 Results from simulating the Luxembourg reform scenario

In this section we present the results obtained when the Luxembourg Agreement scenario, described above, is simulated using the AG-MEMOD Composite Model. All of the results for the EU-15 of the reform scenario analysed are presented as percentage changes from the Baseline results. With the decoupling of direct payments from production leading to lower returns to both cereal and

oilseed production, it is expected that relative to the Baseline EU-15 cereal and oilseed areas harvested and total EU cereal and oilseed production will decline.

As is shown in Figure 1, relative to the Baseline, total EU-15 cereals area harvested is projected to decline by approximately 2%, while total oilseed area declines by approximately 6%.

Within the total cereals area harvested, soft wheat area declines by approximately 2%, relative to the Baseline, with maize area harvested declining by 4% and barley area harvested declining by approximately 1%.

The impact on production of the decline in cereal and oilseeds harvested area is partially offset for some crops by higher average yields per hectare (as less productive land is idled first). In general average crop yields increase as a result of the decoupling of arable aid payments, however, yields for barley, maize and durum wheat remain constant over the simulation period.

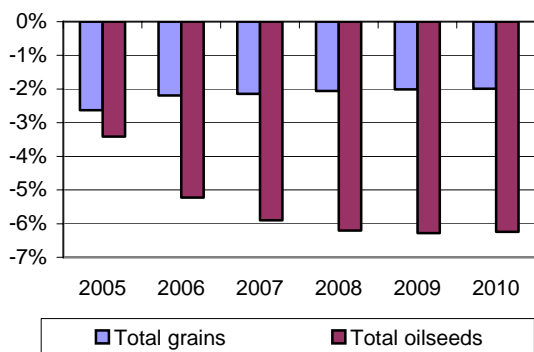


Figure 1: Harvested area, changes from the Baseline Scenario (%)

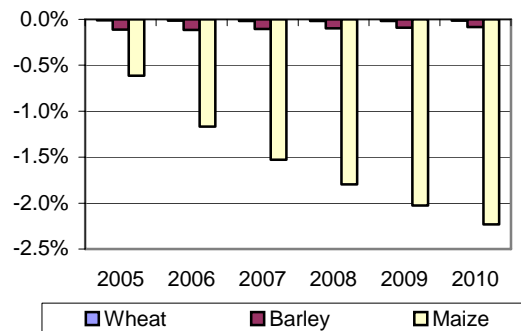


Figure 2: Harvested area, changes from the Baseline Scenario (%)

While the decoupling of arable aid payments from production affects the indigenous EU production of cereals and oilseeds, the impact of the policy reform on domestic use of crops and oilseeds is projected to be minor due to the relatively small impact of the reform analysed on cereals and oilseed prices. Under the scenario analysed EU maize prices are projected to increase by approximately 1.6%, while wheat and barley prices are projected to be largely unchanged, relative to the Baseline.

Despite the reduction in EU production of cereals and oilseeds that occurs as result of decoupling, the net trade status of the EU in respect to all of the cereals and oilseed commodities modelled is not projected to change. EU net exports of wheat, barley and rapeseed remain positive, and the EU remains a net importer of maize, soybean and sunflower seed over the period to 2010.

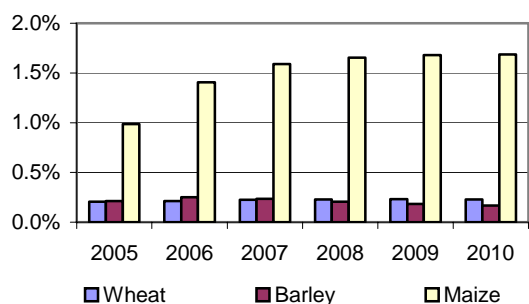


Figure 3: Cereals prices, changes from the Baseline Scenario (%)

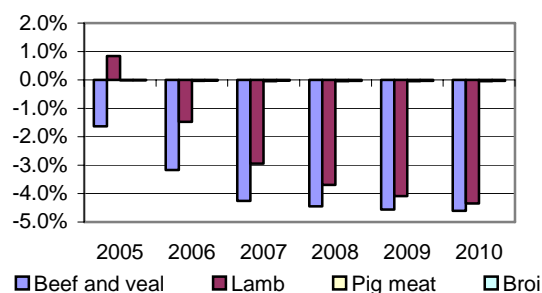


Figure 4: Meat production, changes from the Baseline Scenario (%)

When compared with projections under the Baseline scenario, for those cultures for which the EU under the Baseline is a net exporter (soft wheat and barley) the level of net exports decline under the Luxembourg Reform scenario: for those cultures for which the EU is a net importer under the Baseline (maize, sunflower seeds) net imports increase.

Under the Luxembourg Agreement Scenario analysed all direct payments associated with the beef (suckler cow, special beef and slaughter premiums) and the sheep and goat (ewe premium) commodity market organisations are decoupled from production. The decoupling of these direct payments from production is expected to lead to reductions in the number of breeding animals (suckler cows and ewes) held that ultimately determine the indigenous EU production of beef and

lamb. The impact of the reform on the poultry and pig meat sectors is expected to be relatively minor with any changes that are projected to occur arising from the cross price effects of the reforms of the beef and lamb commodity market organisations.

The projected changes in ending inventories of animals are shown in Figure 10. These changes relative to the Baseline are also reflected in changes in the production of meat associated with these animals. Production of both beef and lamb is projected to decline relative to the Baseline, with beef production declining by almost 5%, while lamb production declines by approximately 4%. Both poultry and pig meat production are projected to be relatively unchanged relative to the Baseline level.

Reductions in the indigenous production of beef and lamb are projected to lead to increases in EU meat prices. The projected changes in EU meat prices are marginal for lamb, pig meat and broiler meat, while beef and veal prices are projected to increase by over 6% relative to the Baseline level.

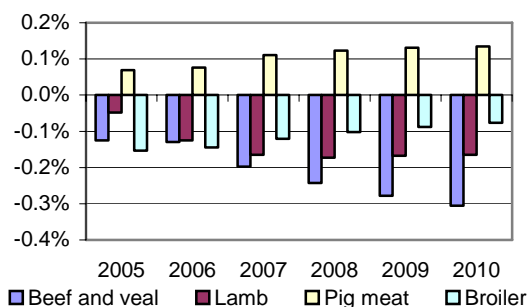


Figure 5: Meat consumption, changes from the Baseline Scenario (%)

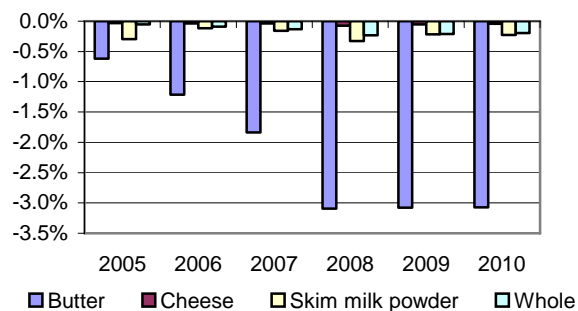


Figure 6: Production of dairy commodities, changes from the baseline scenario (%)

The changes in prices of meat that are projected under the Luxembourg Agreement Scenario lead to changes in EU meat consumption. Under the Luxembourg Agreement Scenario, the relative changes in the prices of the different meats lead, when compared with the Baseline levels, to reductions in EU consumption of beef and veal, lamb and broiler meat, while EU pig meat consumption is projected to increase.

With EU production of beef and lamb declining relative to the Baseline, EU imports of both beef and lamb increase in response to increased internal prices. With EU exports of beef declining and imports increasing, EU net exports of beef decline dramatically relative to the Baseline levels. In 2010, under the Baseline, the EU was a net importer of approximately 50 thousand tonnes of beef, by 2010 under the Luxembourg Agreement scenario, EU net imports increase to almost 380 thousand tonnes. EU net imports of lamb also increase to approximately 45 thousand tonnes, an increase of 13% relative to the Baseline level.

Under the Luxembourg Agreement Scenario butter intervention prices are reduced by 10%. The reductions in dairy commodity intervention prices agreed under Agenda 2000 are also brought forward to the 2004/05 production year, while the dairy compensation agreed under Agenda 2000 and the Luxembourg Agreement is decoupled from 2005 onwards. Importantly, as under the Baseline, the EU milk quota system remains in place. The continuation of the milk quota system means that EU milk production remains largely unchanged when compared with the Baseline. The reduction in the intervention price for butter leads to changes in supply and uses, and prices of dairy commodities.

Relative to the Baseline of no change in EU agricultural policy, the EU market price of butter declines by over 10% due to the reduction in the intervention price of butter: this leads to a 3% decline in butter production. With EU milk production largely unchanged relative to the Baseline, the reduction in the production of butter leads to a reallocation of milk fat, which is largely reflected in increased production of what are known as “other dairy products”. EU cheese production remains largely unchanged when compared with the Baseline. Overall the impact on dairy commodity supply of the reform scenario analysed is relatively minor.

On the demand side the large reduction in butter prices leads to a small increase in EU domestic use of butter when compared with the Baseline level. EU domestic use of other dairy commodities remains largely unchanged. As is clear from Figure 13, the largest changes under the scenario occur in the EU butter market. These are reflected in changes in the EU net trade position in butter.

Under the Baseline the EU is a net exporter of butter, with net exports in 2010 projected to run at just under 5 thousand tonnes; under the Luxembourg Agreement Scenario with declining EU production of butter and marginally increased domestic use, the EU becomes a net importer of butter. By 2010, under the scenario, EU net imports of butter are projected to run at almost 54 thousand tonnes. Net exports of other dairy commodities also decline relative to the Baseline, though the

changes relative to the Baseline that are projected under the scenario are not as dramatic as those that are projected to arise in the butter market. Under the Luxembourg Agreement scenario the EU is projected to remain a net exporter of cheese, skimmed and whole milk powder.

3 The AGMEMOD Baseline and Scenario Results for the CEEC

3.1 Description of the Baseline scenario

In this report the Baseline represents agricultural policy in the CEEC as it might have existed had Accession not occurred. As such it shows market outcomes in the absence of a shift in agricultural policy or enhanced economic progress in these countries – the situation that would exist if Accession did not take place.

In what follows some of the more interesting features of the Baseline results from the CEEC models are summarised. Essentially, it is a description of the short to medium term potential of the sectors modelled, if they remained outside the EU for the next decade. The main conclusions coming from this Baseline are that a continuing re-orientation of agricultural production would take place in the future. There would be a continued increase in crop production in the CEEC and a slight increase in production in the livestock sector. Notably, the projection results indicate differences in the magnitude of the effects across the various countries modelled, which is an important attribute of the model's output. In the discussion of the AG-MEMOD CEEC Baseline, percentage changes refer to the change in production by 2010 relative to 2001.

3.2 Baseline Results - Crops

There is considerably variability between countries in the projected path of grain production across the CEEC over the period to 2010. Under the Baseline, the CEEC would greatly reduce their net imports of grain, with Romania in particular providing a significant increase in its production of wheat (up over 50 percent) and Latvia, Lithuania, Slovakia and Slovenia also recording sizable increases. Increases in barley production tend to be more modest.

At the other extreme, the projections indicate that Hungarian production of wheat and barley would contract, with a switch of arable land into the production of maize. Production of wheat and barley in Bulgaria would also contract and again increased levels of maize production are projected. Small reductions in barley production in Latvia and Romania are projected.

For the remaining countries the projected changes in the production of grains under the Baseline are positive and less than 10 percent. In aggregate, CEEC production increases by about 10 percent in the case of wheat and 2 percent in the case of barley. The increase in maize production is more substantial at over 30 percent, largely driven by the strong increase in production in Hungary at the expense of production of other grains. Maize returns are relatively higher than for the other grains due to higher rates of yield increase. Demand from the EU15 for livestock feed should also be a factor. Technological transfer tends to be stronger in the case of maize than in the case of wheat and barley. Quality issues may remain a factor also in the case of the other grains, especially soft wheat, and this again may make maize production more attractive. In aggregate CEEC grain production is up over 15 percent on the 2001 level by 2010. The projected Baseline production of grains and oilseeds in the CEEC is illustrated in Figure 7.

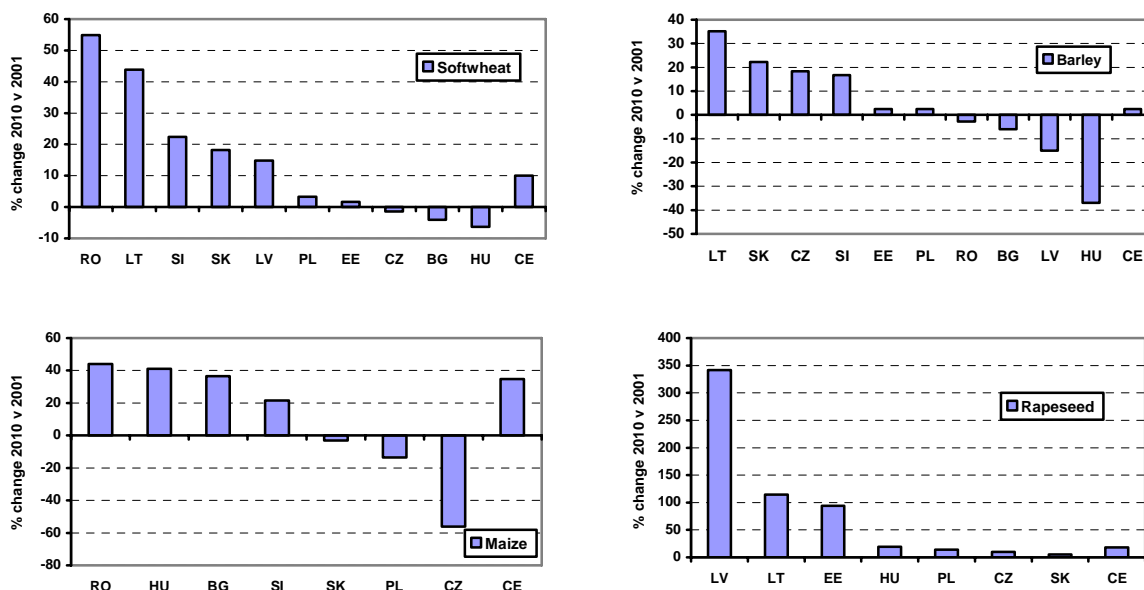


Figure 7: CEEC Grains & Oilseeds Production: Baseline Projection

Over the long term and in the absence of EU Accession the CEEC would achieve sizable increases in net exports of grains. Self sufficiency rates in maize in Hungary, which are already high, continue to increase under the Baseline projection, as do wheat self sufficiency levels in Bulgaria. Over the Baseline projection period, Hungary and Bulgaria are by far the main contributors to the CEEC positive net trade balance for grains.

The positive outlook for the CEEC grain sector under the Baseline is explained by the fact that, in general, the CEEC grain sector is relatively competitive and that production on large scale farms, with appropriate modernisation of technology, could be economically attractive. The view of country experts is that there may be differing developments in terms of export potential, for the individual countries modelled. Increases in human consumption for specific grains such as soft wheat in Poland and increased feed utilisation of barley and maize in countries such as the Czech Republic and Hungary lead to divergence in the projected rates of growth of production and exports in some countries.

For oilseeds there are positive Baseline production trends in some CEEC, notably in Poland, the Czech Republic and Hungary. This is, in part, an outcome of the good industrial scale production facilities that already exist. For rapeseed there is extremely strong Baseline production growth projected for the Baltic States. The increase in production in Latvia is over 300 percent, with increases in Lithuania and Estonia of the order of 100 percent. Production in these countries is nevertheless much less than in Poland and the Czech Republic, which remain the main rapeseed producing countries of the CEEC. Production growth in Poland and the Czech Republic is projected to be 15 percent and 10 percent respectively, and thus, overall production growth for the CEEC as a group is close to 18 percent.

However, the results for some countries have to be examined carefully and further work on data and models, in particular for the grains sector, is required.

3.3 Baseline Results – Livestock and Livestock Products

Projected production of beef and milk in the CEEC is illustrated in Figure 8. The overall Baseline picture for the CEEC indicates that some growth in beef production would take place. The only exceptions to this outcome are Slovenia and Latvia. Strong Baseline production growth is recorded elsewhere in the Baltics, with Latvia and Estonia showing increases in production of 30 to 40 percent.

Overall, the Baseline beef results indicate that the CEEC in aggregate would produce a modest exportable surplus in the medium term, with volumes exported close to those achieved in the late 1990s. However, the CEEC beef sector is under continuing pressure due to economic inefficiencies relating to its on-farm production technology. Beef production is generally based on dual-purpose cattle, mainly used for dairy production. A lack of quality standards and problems with hygiene requirements at abattoirs, adversely affect beef production and export potential in the majority of countries.

In beef the net trade position of the CEEC has fluctuated and the region has been both a net exporter and net importer of beef at various points in the last 10 years. For the projection period, the Baseline outlook shows a net export capacity emerging over time in Poland and Hungary. Several other CEEC become modest net exporters of beef, such that by the end of the Baseline projection period the CEEC (as a group) could export over 10 percent of their beef production in the absence of EU Accession.

In this study, several problems arose in the modelling of the dairy sectors of the CEEC, particularly with respect to data acquisition. In some countries the Baseline dairy outlook is for production to continue to recover from levels which are below those observed in the early 1990s. Elsewhere, aggregate production is to remain depressed as small scale producers disappear. While in most countries dairy production by larger producers expands to offset the exit of smaller producers there are some exceptions, where aggregate production is projected to fall. An additional problem is likely to be the need for compliance with hygiene requirements, which in some cases are likely to remain unfulfilled. The most positive medium term Baseline production prospects exist for the dairy sectors in Romania, Bulgaria, Poland and the Czech Republic. Poland is by far the largest CEEC milk producer (although much of this is for internal consumption) and Polish Baseline milk production growth is expected to be less than 10 percent.

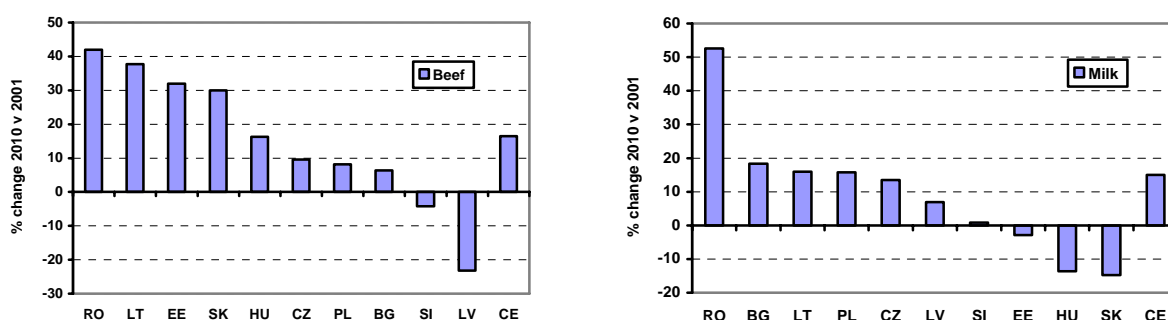


Figure 8: CEEC Beef & Milk Production: Baseline Projection

Projected production of pig meat and poultry in the CEEC is illustrated in Figure 9. The Baseline results suggest no widespread growth in CEEC pig meat production over the Baseline projection period. Pig meat production in most of the countries modelled remains relatively stable. Only Poland, Lithuania and Estonia exhibit increases in Baseline pig meat production that are worthy of note. Of those three, only Poland's pig meat production levels are substantial, so increases in production elsewhere affect overall CEEC production to only a small extent. Pig meat production in Hungary, the other main pig meat producer in the CEEC, is projected to contract under the Baseline. Overall, the pig meat net trade position for the CEEC in aggregate remains slightly positive and Hungary and Poland remain the largest net-exporters.

Several reasons can be advanced for the modest growth in Baseline CEEC pig meat production. Many pig meat producers are smaller in scale and the conversion of feed into meat tends to be inefficient, which, in turn, results in lower quality carcasses. The burden of raising standards in the meat production and distribution chain to meet hygiene regulations for export to the EU also hinders growth in some countries. It will take time for the CEEC to remedy this situation, hence the view that a contraction in production seems likely in some countries in the short term. However, by way of contrast, in some countries an increase in Baseline pig meat production is projected, in many cases this is due to the low level of existing production, but in some cases is due to increased pig meat demand, reflecting a shift by consumers away from red meat towards white meats.

Poland's improved net trade position in pig meat tends to be offset by the projected contraction in net exports from Hungary. Poland may be likely to find increased export opportunities for its pig meat in the EU15. Some countries, notably Bulgaria and Slovakia, remain net importers of pig meat throughout the Baseline projection period. In general for the CEEC group increased domestic consumption of pig meat also limits exportable supplies. However the overall pig meat net trade position of the CEEC under the Baseline projection remains positive and increases relative to the 2001 level.

The Baseline outlook for broiler production across the CEEC is broadly positive. Baseline production growth in Poland allows it to become a net exporter of broiler meat. This growth reflects the benefit of capital investment and restructuring which has been made in Poland and in some other CEEC. Overall, the sector should become more competitive and this is projected to facilitate increased net exports from a number of CEEC. An important factor, which will benefit the sector, is

the increasing demand from consumers for white meat. There is significant positive growth in the production of poultry meat in the Baltic States, Slovakia and Bulgaria.

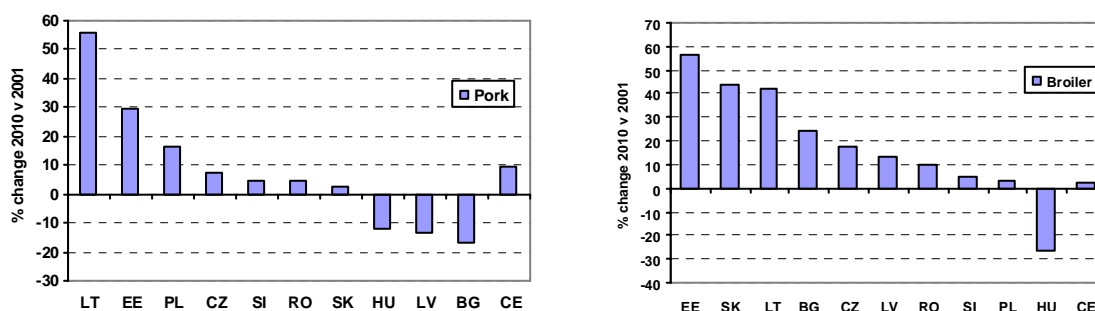


Figure 9: CEEC Pig meat & Broiler Production: Baseline Projection

The rate of increase in broiler production in the Baltic States is particularly strong, even though production in these countries is not substantial. Surprisingly, Baseline broiler production in Hungary is projected to decline to a point at which by 2010 the sector is no longer a net exporter of broiler meats. The poultry sector in Hungary may experience production problems in complying with EU standards in terms of poultry related welfare and phyto-sanitary legislation. These requirements may increase production costs and, without the foreign direct investment necessary to resolve this difficulty, the broiler sector in Hungary may struggle. Appropriate investment and technological progress in the broiler sector in Hungary could lead to a more favourable outlook than is projected here. Overall, the Baseline poultry projections indicate a small positive change in broiler production for the CEEC in aggregate by 2010.

3.4 Baseline Results – Domestic Use

Despite the relatively static population projections for CEEC, higher real per capita income levels when combined with limited real price changes are projected to lead to higher human consumption of agricultural products under the Baseline. This is particularly the case for broiler meat, pork and dairy products. Beef consumption is projected to remain relatively static.

Generally, at the aggregate CEEC level, there is a positive trend in Baseline feed demand reflecting the modest upward trend in Baseline livestock production. Country variations in projections of Baseline feed use generally reflect differences in the share of the type of livestock found in each of the CEEC. These feed projections will require further investigation. Future model development will seek to improve the capacity of current models to capture the interaction of animal production and feed demand in CEEC.

3.5 Accession Scenario: Sample results for EU New Member States

3.5.1 Description of Accession Scenario

Following from the Accession Agreement negotiated at the Copenhagen EU Summit in 2002, the NMS acceded to the EU on May 1st 2004. Models for eight of these 10 states were used to produce results of the impact of this Accession, based, in most cases, on the adoption of the decoupled flat rate area payment known as the Simplified Area Payments Scheme (SAPS). On Accession it has been agreed politically that the level of direct payments in the NMS will rise gradually from 25% of the EU15 payments level in 2004 to 100% in 2013. The Accession countries can, to some extent, provide additional payments ('topping up') through national financing (European Union, 2003).

In June 2003, after the Accession negotiations were completed, the CAP reform was decided. With the Luxembourg Agreement reform of 2003, the EU entered a new policy and budgetary era, which is to last until 2013. The objectives of agricultural policy, as well as the types of support provided, have changed. The reform introduced decoupled area payments based on the level of funds received during a defined reference period.

The 'old' and 'new' EU Member States have to implement the CAP reform in the period from 2005 to 2007. With this reform, the CAP will become less and less uniform across EU Member States. Due to the fact, that the NMS do not have an historical reference period for payments, they are compelled to adopt the regional version of the Single Payment Scheme (SPS), which implies uniform payments per hectare (although payment levels for arable crops and grassland can be

differentiated). As with the measures in the EU-15, it is possible to retain coupled measures for a period. From this Accession and reform process two main Accession scenarios can be derived:

- 1) **Accession under SAPS** (with changes in prices occurring as convergence occurs following Accession in 2004) and SAPS in place until 2012. For Bulgaria and Romania this scenario starts at 2007 and is the only scenario.
- 2) **Accession and CAP Reform** (Luxembourg Agreement and special regulations for New Member States). Similar to scenario 1, but from **2007** onward the SFP (single farm payment - area payment divided in to arable aid payment and payment per hectare of permanent grassland). This scenario is examined for all CEEC, except Bulgaria and Romania.

In the analysis conducted Scenario 2 (Accession and CAP Reform) was examined: the results presented below do not refer to Scenario 1 (Accession under SAPS).

3.6 Results from simulating the Accession Scenario - Crops

These are the first Scenario results of the AG-MEMOD model for Accession countries and as such they remain tentative, since their main purpose is to illustrate the possibilities that exist to use the model as a policy analysis tool. Since these are the first steps in the analysis of these policy reforms with these models, care should be taken in interpreting the output. It is clear that there are opportunities to improve the models' projection capacity, and in particular continued work is required on the data sources and the methodology to handle the switch in payment systems brought about by Accession.

The projections are based on the Accession of the NMS - as of May 1st 2004 and the resultant outlook to 2010. Scenario projections for Bulgaria and Romania relate to the implementation of the SAPS only. Results are best interpreted by contrasting the projections produced under these scenarios by 2010 with the Baseline projections for 2010.

As under the Baseline, there is considerable variability in the projected path of soft wheat production across the NMS. While some of this can be explained by the manner in which the policy has been incorporated in the models, it is clear that differences in the competitiveness of the countries examined are also reflected in the results. Under the Accession Scenario, NMS production of soft wheat shows a modest increase in aggregate relative to the Baseline position in 2010.

The percentage change in the projected production of grains and oilseeds relative to the Baseline in the NMS is illustrated in Figure 10. In general, crop producers are projected to gain from Accession due to increases in output prices and direct payments. However, this does not lead to an increase in production of all crops. Model results indicate a trend towards greater production of oilseeds and a switch between particular grain crops. In some of the countries modelled, namely the Czech Republic and Hungary, there is a decrease in soft wheat production relative to the Baseline outcome. For Poland the increase in production that is observed following Accession is less than 10 percent. Romania exhibits the strongest growth in soft wheat production relative to the Baseline. For the CEEC in aggregate, there is only a marginal change in soft wheat production post-Accession relative to the Baseline. Despite the slightly higher production levels under Accession, CEEC net exports of wheat are a little lower than under the Baseline due to higher levels of feed use. Further exploration of the results is necessary.

In Hungary and Poland, two of the largest barley producers in the CEEC, production increases after Accession, relative to the Baseline by 13 percent and 8 percent respectively. Barley production decreases slightly relative to the Baseline in the Czech Republic, Slovenia and Slovakia. Together the net effect of these production changes amount to an increase in NMS barley production of about 4 percent relative to the Baseline. Increased barley production contributes to a growth in net exports of barley relative to the Baseline in Poland and Hungary, while in many of the other countries there is little change in the net exports of barley compared with the Baseline.

Under Accession, production prospects for maize are better than those for wheat and barley, with CEEC production running 7 percent above the Baseline level by 2010. Hungary and Bulgaria are the sources of the increases in production that are most worthy of note.

Overall, grain production in the CEEC increases under Accession by about 3 percent relative to the Baseline in 2010. As mentioned previously, sizable increases in CEEC rapeseed production are projected in many of the countries modelled under EU Accession. Under the Accession Scenario, the strongest increases relative to the Baseline are recorded in Hungary, Poland and Slovakia, with more modest growth in other countries. This result is explained by the much improved economic and structural conditions post-Accession.

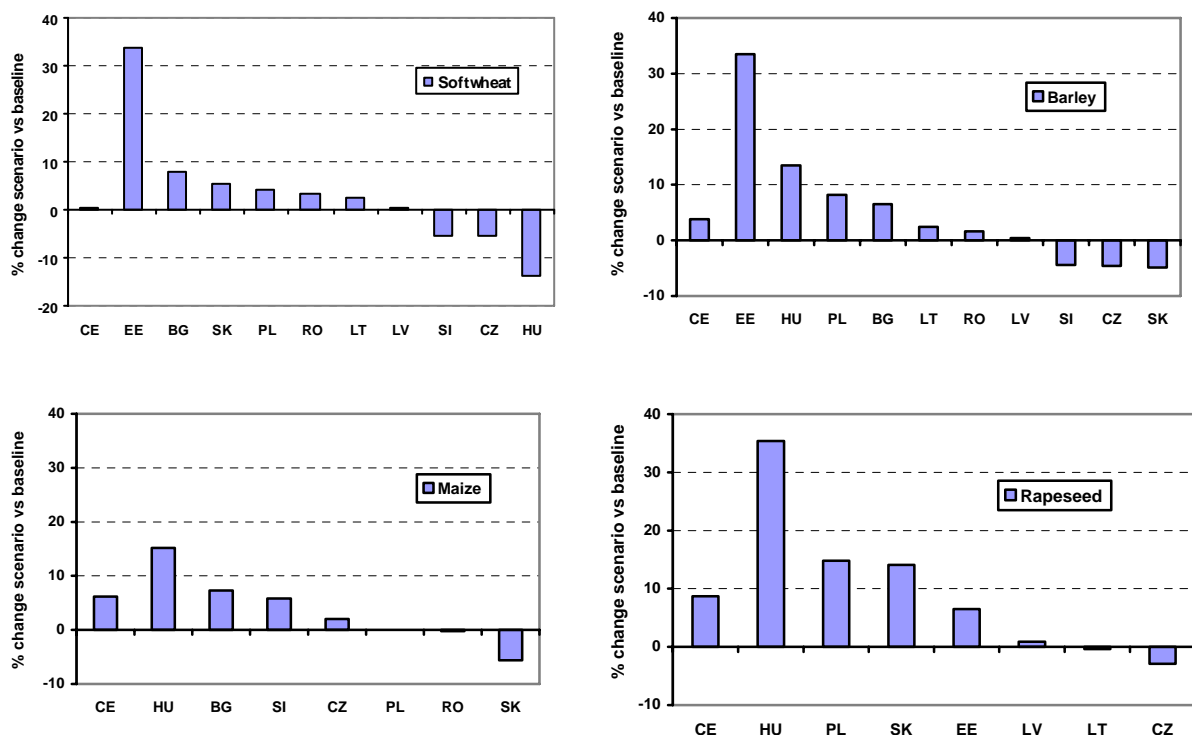


Figure 10: NMS Grains & Oilseeds Production in 2010: Accession Scenario % Change Relative to Baseline

3.7 Results from simulating the Accession Scenario – Livestock and Livestock Products

The percentage changes in the projected production of beef and dairy under the Accession Scenario, relative to the Baseline, in the NMS are illustrated in Figure 11. The Accession Scenario projections indicate that Accession to the EU will have a positive effect on beef production in most NMS. The rates of increase in production are substantial in some of the NMS. Latvia, Estonia and Romania show the largest beef production increases relative to the Baseline. The respective outlooks for Romania and Bulgaria (still outside the EU in this scenario) contrast with each other, with a slight reduction in beef production projected in Bulgaria, relative to the Baseline.

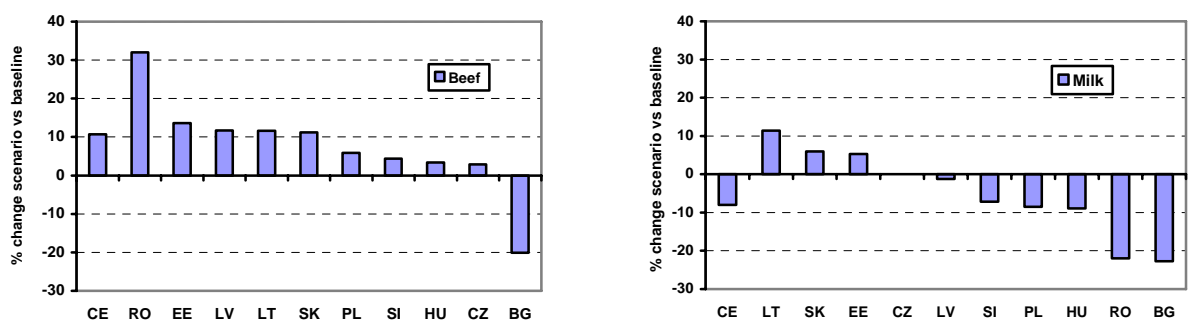


Figure 11: NMS Beef & Milk Production in 2010: Accession Scenario % Change Relative to Baseline

The Accession Scenario results indicate that the CEEC in aggregate would produce a small exportable surplus of beef in the medium term, but that this surplus is smaller than that projected under the Baseline due to the constraining effect that EU milk quotas have on the expansion of the cattle breeding herd. This result comes from the fact that beef production is not in a particularly strong competitive position before the Accession, but gains competitiveness following Accession due to the output price increases and the provision of additional budgetary support.

In the CEEC dairy sector, the introduction of the milk quota under EU Accession influences the milk production in the CEEC to differing degrees, depending on whether or not there is some slack in the reference quantity secured under the Accession Agreement. In general, production changes are

small and Accession should support the restructuring of the milk sectors in CEEC. Production in several countries is lower with Accession than under the Baseline, this suggests that the milk quota and other market developments will have a constraining effect in these countries. Overall, CEEC milk production is down by about 8 percent relative to the Baseline. Of the Accession countries, Poland and Hungary show the greatest reduction in milk production under Accession relative to the 2010 Baseline position. The production of cheese and milk powder may gain in importance in the CEEC as market opportunities across the EU increase. Some phyto-sanitary and quality issues can be expected to arise in the short term and over the longer term the competitiveness of the dairy sector in the CEEC may be questionable.

The percentage change projected in the production of pig meat and broiler meat under the Accession Scenario relative to the Baseline in the NMS is illustrated in Figure 12. The Accession Scenario results suggest an increase in NMS pig meat production relative to the Baseline of over 10 percent. However, production in some of the countries modelled (namely Latvia, Slovakia, and Slovenia) declines relative to the Baseline. This decline is explained by the relatively high level of pork prices in advance of Accession. In many of the NMS, prices for EU15 quality carcasses were above those of EU-15 exporters before Accession.

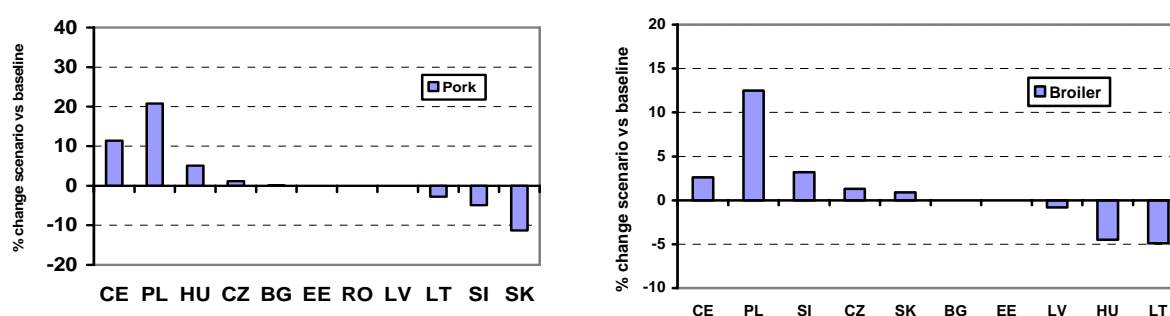


Figure 12: NMS Pig meat Production in 2010: Accession % Change Relative to Baseline

Under the Accession Scenario, pig meat production remains at about Baseline levels in Bulgaria, Romania, Estonia and Latvia. Growth prospects are more promising in Hungary and particularly in Poland, where an increase in production of 20 percent relative to the Baseline is projected. A slight increase in net exports of pig meat is projected, but increased domestic consumption limits the growth in pig meat exports. Accession will bring more competitiveness threats where domestic pig production has problems in addressing quality and price issues.

Broiler production under EU Accession shows notable growth in the long term in a number of the CEEC, most notably in Poland. Surprisingly, the results indicate that production may fall in Hungary, which historically has been a major net exporter of broiler meat. For the CEEC, under Accession, an aggregate increase in production of 3 percent over the Baseline level is projected. Large scale investment following Accession should improve broiler production and processing facilities in most NMS. However, competition from the EU-15 after Accession could, in the short term, negatively affect NMS broiler production. Again, as mentioned in the discussion of the Baseline, the outlook for poultry production in Hungary could be better if foreign direct investment is available to resolve production difficulties faced by the Hungarian poultry sector.

4 Conclusion

The Luxembourg Agreement reform of the CAP represents a major change in EU agricultural policy. Using results from simulations of the AG-MEMOD composite model, an econometric, dynamic, multi-product, partial equilibrium commodity model, this report has presented detailed medium-term prospects for EU agricultural markets under a scenario where the most extreme implementation plan allowed for under the Luxembourg Agreement occurs.

The medium-term prospects for EU-15 agricultural markets as represented by the Baseline and the Luxembourg Agreement Scenario results are based on a number of assumptions - in particular in the current AG-MEMOD composite model's Baseline the Accession of the EU-10 group on the 1st of May is not incorporated. In this respect the results presented in this paper are subject to some uncertainties that could have major implications for EU markets.

As noted earlier an important assumption underlying the analysis with the composite AG-MEMOD model that is presented in this paper was an assumption that the European Union's external trade regime will remain unchanged over the projection period. The ongoing Doha Round of the

WTO, if successful, could lead to significant change in the EU external trade regime, internal EU agricultural policy, and in the balance of international agricultural commodity markets. Future work with the AG-MEMOD composite model will seek to develop the capacity of the composite model to evaluate the consequences of changes in the external trade regime of the EU.

This report has also outlined the progress that has been made in developing country level models for the agriculture sectors of the CEEC, covering most of the NMS and those who will accede to the EU in the short term. The work represents a positive development in the analysis of the impact of agricultural policy changes for the countries that are modelled.

These first results remain tentative and further investigation with the aim of improving the model design and engaging country experts in more detailed reviews of the output is warranted. The potential for future analysis with the tool developed in this project of policy issues such as trade reform (WTO) and further CAP reform is clear. Future research plans to focus on the completion of the models for CEEC and their integration with the composite EU-15 model to form an EU-25 model. This would facilitate EU-25 policy analysis at country specific level. The development of similar models for countries identified for future Accessions, as well as models for trade relevant countries neighbouring the EU, would also be a priority together with methodological improvements in how the model captures and reflects the impact of policy on agriculture in the expanded EU.

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Appendix: The AG-MEMOD Partnership

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