Outlook 2000 Conference, March

Global and EU Markets for Agricultural Products
Professor Bob Young, FAPRI, University of Missouri

Agricultural sector outlook for Ireland
Julian Binfield, Trevor Donnellan, Kieran McQuinn, Teagasc

On-farm effects of Agenda 2000 CAP Reforms
Thia Hennessy, Teagasc

Agri-business and economy wide effects of the CAP Reforms
Professor Alan Matthews, Trinity College Dublin

Future developments in policies and markets, including exchange rates
Kieran McQuinn and Brendan Riordan, Teagasc

1 Outlook for World and European Union Agriculture

Robert E. Young II and Patrick W. Westhoff.
Food and Agricultural Policy Research Institute,
University of Missouri.

Introduction

The 1990's witnessed significant cycles in world grain production. At the end of the 90/91 grain marketing year, world stocks of wheat, rice, maize, barley and sorghum amounted to the equivalent of nearly 93 days of world consumption. Between the 91/92 and 95/96 marketing years however, production increased at less than the rate of consumption, due in large part to annual swings in production during that period. Coming out of the 95/96 marketing year, the world was down to a 55 day stock of grains, with wheat prices exceeding $200/ton (fob Gulf).

With policy changes in the United States and Canada and the strong market price signals in place from the 95/96 crop, world grain production exploded by 9% in 1996/97 relative to year earlier levels. This was one of the largest single year increases on record. The growth came from higher plantings (21 Mha increase over 95/96 levels) and a record world grain yield (2.85 ton/ha). Even with a 3.7% rise in world consumption, the growth in production was sufficient to boost carryout of grains from the 96/97 marketing year to a 61 day supply.

By itself, 96/97 was a watershed year for world grain production. What followed subsequently, has put world agricultural markets in a hole that has and will take years from which to extricate itself. Unlike the previous five years, the 97/98 and later years have not demonstrated the annual fluctuation in production levels. While 96/97 was a record year grain production has continued to show year over year increased ever since, with the exception of the 99/00 markeing year. Even though prices have adjusted to the increase in supply, reserve supplies of grains have continued to increase. By the end of the current marketing year, 1999/00, it is expected that world grain reserves will have increased to 70 days. At the same time, fob Gulf wheat prices are expected to average only $115/ton.

The feeling of doldrums is not isolated to the grains sector. Oilseed prices have also plummeted. Hog prices are only just beginning to show some signs of recovery after sharp declines between 1996 and 1998. fob Europe butter, cheese and milk powder prices set highs in 1995, only to have prices for the same commodities drop by a third by 1999.

In general, market prices for most agricultural commodities have dropped significantly since the highs of the mid 1990's. This paper will provide further review as to the causes of declines in these agricultural markets. It will then proceed with a discussion of a mid-term projection for the sector covering the period 1999 through 2009. The factors expected to provide some additional market price support over the coming decade will be part of that discussion. In providing that outlook, initial comments regarding the macro-economic and policy assumptions will be provided, along with a particular emphasis on the expectations for the European Union.

1.1 Assumptions

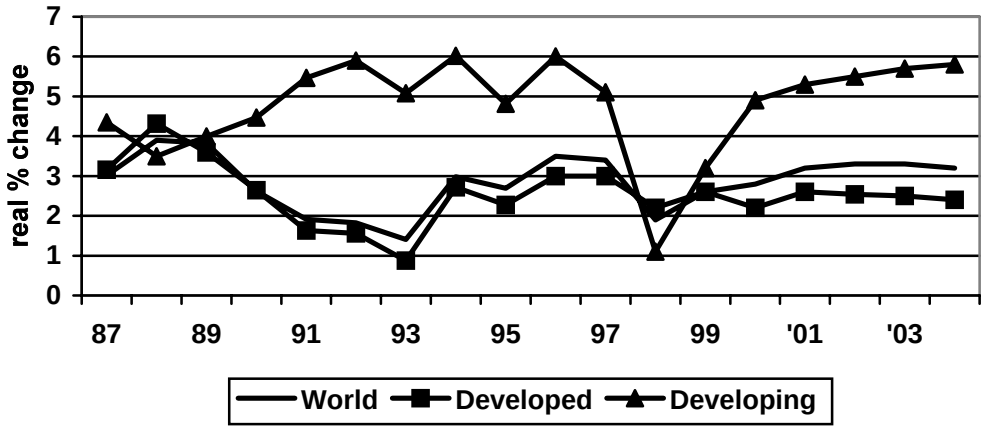
Projections for general economic variables, such as economic growth rates, interest rates, fuel prices and exchange rates come from three sources;

- The WEFA Group, a Philadelphia based economic forecasting firm with a long history associated with the Wharton School of Business,
- The United Nation's Project Link, which brings together economists from around the world to combine their various projections, and
- Data Resources Incorporated, a Boston based economic forecasting group.

The outlook for a variety of countries are combined between these three groups utilizing a variety of internally developed rules.

For the most part, these general economic projections suggest most markets have recovered from the economic collapse of late 1997 and 1998. They go so far as to suggest that even the Russian economy will show positive growth in 2000 and for the remainder of the projection.

Figure 1-1: Real GDP Annual Growth Rate



In general, the developed economies are expected to grow in the 2.4-2.6% range for the majority of the projection period. For 2000 in particular, the growth in United States is expected to slow relative to 1995 rates taking Canada lower as well. In contrast European Union growth is expected to rise to 2.5 per cent, while Japan continuing to show only slow growth. In subsequent years, no recessions or booms are projected, with the steady growth rates indicated.

The developing countries are also expected show positive growth through much of the period. Eastern Europe countries should improve with real growth rates in the 4.5-5.0% range through much of the projection. The **Russian economy** however, is anticipated to grow by less than 1% in 2000. Real GDP is anticipated to improve by less than 3.5% through 2002 and only then rising by a 3.6-3.7% growth rate.

After several years of slower growth, the **Chinese economy** is projected to expand by more than 7% per year after 2002. Many of the other East and South Asian economies, such as Indonesia, Malaysia, Thailand and Taiwan exhibited only sluggish growth – effectively recessionary behaviour by their standards – in 1999. These economies and others in the region are anticipated to improve somewhat in 2000, with full recovery in place throughout the region by 2001.

Latin America went through a very difficult period in 1999, with Argentina, Paraguay and Venezuelan economies in an actual recession. The Brazilian economy while not in recession was stagnant during the same period. 2000 should give an improvement throughout the region. Oil prices should help Venezuela in particular, but the difficulties in many of the other countries should also begin to come into hand. Brazil should average growth at or near 4% from 2001 and beyond, with Argentina approaching or exceeding the 5% level during the same time frame.

Many of the **North African** countries are anticipated to demonstrate significant growth during the period as well, with the **Middle Eastern** countries such as Iran or Saudi Arabia also demonstrating reasonable economic improvement. This is expected to be particularly true for Saudi Arabia in 2000, but even in subsequent years real growth there is anticipated to average in the 2.5-3.5% range.

Demographic projections developed by the United Nations suggest some significant trends. Traditionally, world grain and oilseed yields have increased at a rate of 1.2-1.5% per year. Little in the way of research suggests that this trend is likely to slacken during the projection period. If anything, with adoption of new approaches to plant breeding, the rate of growth may even increase. Population growth rates prior to 1975 declined from over 2% per year to levels around 1.75% and continued to grow at around that rate through the 1980's. The early 1990's saw population growth drop to 1.5% per year. By the mid 1990's population growth was down to 1.3% per year and United Nation's projections suggest growth rates as low as 1.2% by the middle of the next decade.

This will be a significant factor for long-term expectations for the sector. Given a constant land base, yield growth in excess of population growth suggests continued, long-term price pressure on the grains/oilseeds sector. Much of the growth in demand for grains will come not from direct human consumption, but rather through higher meat consumption. Consequently, this convergence of the growth rates in yields and population suggests that any softening of income growth leading to a reduction in the rate of growth in per capita meat consumption will have fairly quick consequences for grain prices.

The size and duration of the increase in **energy prices** could have a marked effect on the sector as a whole. Given the energy involved in much of production agriculture, sharp increases, particularly at planting/harvesting periods, can further compound the effects of low commodity prices. This projection anticipates energy costs averaging in the mid $20/barrel range for 2000. This is somewhat below current or future market price levels. In later years, oil prices are anticipated to continue to hold in the $20-$25 per barrel range as demand will likely continue to pressure supplies, even with additional supplies from Iraq and other countries.

Exchange rates are another area where the conditioning assumptions are somewhat at odds with the current market situation. This is most obviously the case when comparing the dollar/euro conversion rates. The baseline anticipates 1 euro would purchase $1.16 in 2000, with the dollar continuing to depreciate relative to the euro in 2001 and again in 2002, moving to a long-term equilibrium rate near $1.21 per euro. Clearly, without some major market disruptions later in 2000, such an outcome is now – mid-March – seen as fairly unlikely. This is a significant factor in the European Union. However, the dollar/euro exchange rate is not as large an issue in many of the other markets. Other papers at this conference address the issue directly, giving a good indication of the magnitude for Europe and the world of alternative exchange rate adjustment paths and equilibrium levels. If the euro does prove to be weaker than assumed in the baseline, world commodity prices expressed in dollars would be lower and in expressed in euros would be higher. But the fundamental demand situation would not necessarily be altered significantly. The sources of supply to fill that demand however, might certainly shift.

In summary, the world macro-economy has gone through some significant pressure in the last few years. Over the next few years however, most economies are expected to improve, moving global growth projections from the 1.9% level observed in 1998 closer to 3.0-3.5% as quickly as 2001. Should this economic improvement be realized, it will represent a much more robust world agricultural demand situation over the coming ten years than has been observed over the last three years.

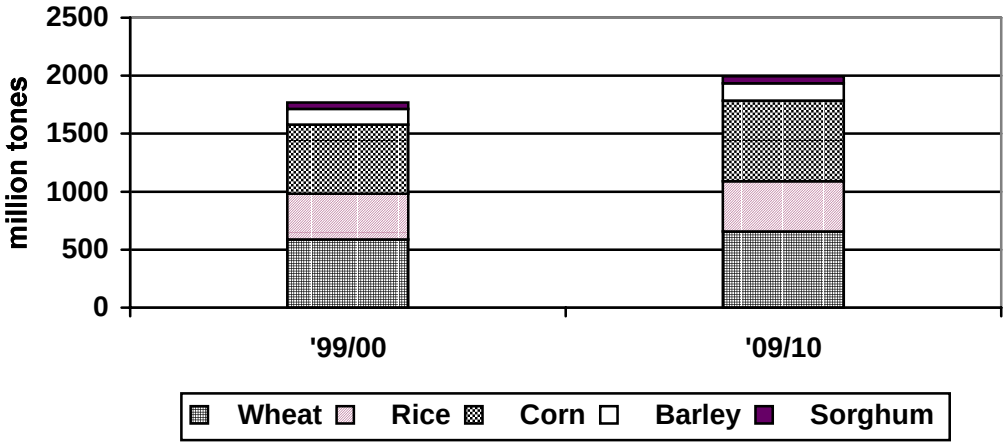
1.2 World Grain and Oilseed Markets

World grain consumption is expected to rise by 13%, or 225 million tons between 99/00 and 09/10 marketing years. During the same period, oilseed consumption, measured by crush demand, is expected to grow by 20%. Along with consumption, trade in grains is expected to rise by 23% (46 million tons) with oilseeds anticipated to show a 20% increase (9 million tons).

Within the grains, **maize** consumption is expected to show the largest overall and percentage increase in consumption, rising nearly 100 million tons. Wheat use is also expected to grow by around 1% per year or 69 million tons over the decade. Rising income levels in the developing economies should help stimulate the growth in wheat demand, with increased supplies from the European Union keeping price rises relatively modest. Stronger feed utilization brought on by a shift toward greater proportion of animal

proteins in the diet as income rises generates the preferential increase in maize utilization. The projection further incorporates this concept as rice utilization is only expected to rise 9% over the period.

Figure 1-2: World Grain Consumption



In general, maize will continue to dominate the coarse grain trade. The United States averages around a 75% market share in world maize trade. For the projection period, China is expected to shift from a net exporter to a net importer position. This shift will allow world maize trade to increase by 15 million tons, with the United States holding on to an 80% share level.

The **wheat market** is a more complicated story, with the change in the CAP playing a significant role. Part of the purpose of the reform is to make European products more competitive in world markets, without the use of export subsidies. In short, this baseline projection suggests for wheat that the policy reform will meet this objective. The dollar/euro exchange rate is critical as to the timing of when the European Union is released from GATT imposed quantity or export subsidy constraints. Under the baseline conditions, Europe is expected to be able to export wheat without using subsidies starting with the 03/04 marketing year. Under the ESRI exchange rate scenario – with its much more modest euro appreciation path – Europe is able to export as soon as the 01/02 marketing year.

Once freed from the constraints, Europe is able to capture a major portion of the growth in world demand for wheat. Europe is expected to capture more than 60% of the 15.4 million tons expected increase in world wheat trade from 03/04 through 09/10. The remainder is spread through all other major exporters.

Consistent with past projections of wheat markets, the developing countries are expected to provide the growth in demand. Over the projection period, developing country wheat demand is anticipated to grow by 17.3 million tons. Very few single countries stand out as dominating the increase in wheat trade. China is expected to raise it's wheat import needs by more than 3 million tons from 99/00 levels. India on the other hand is anticipated to lift their needs by only 1 million tons

Barley trade is anticipated to show 21% growth. Unlike wheat, European barley exports are not expected to grow over the projection period. From 99/00 through 09/10, European barley exports are expected to be unchanged. The policy reform is effective for wheat, but is not anticipated to result in significant commercial exports of barley given the level of CAP supported price and world barley prices.

Oilseed markets will continue to be dominated by soybeans, with only marginal shifts in production share between soybeans, rapeseed, sunflower and peanuts during the projection period. The United States has increased plantings significantly in the past few years. The passage of the 1996 farm program eliminated limitations on shifting plantings between wheat, feed grains and oilseeds. This has allowed producers to shift toward more profitable crops. One of the main crops producers have moved into has been

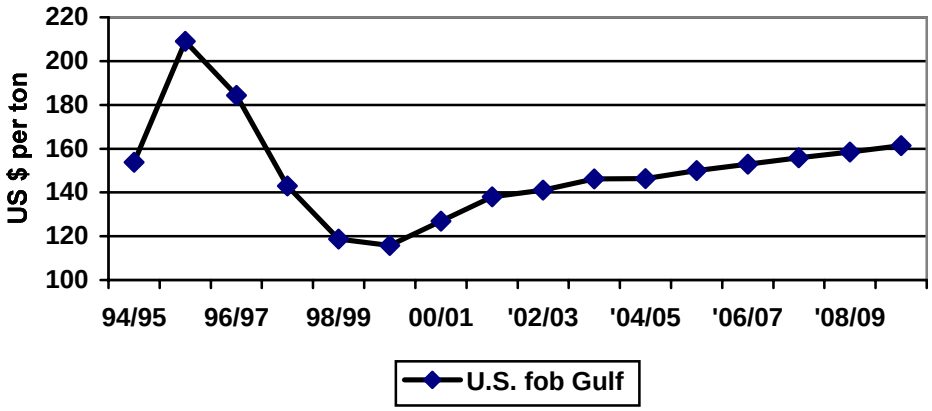
soybeans. Since the passage of the Act, United States soybean plantings have increased by 4.4 Mha. During that same period however, Brazilian soybean plantings have risen by 2 Mha.

Soybeans and thus the entire oilseeds complex were affected by the Brazilian real devaluation. The monetary action significantly reduced the world price for soybeans. Between the 97/98 and 98/99 marketing year, soybean prices dropped 23%. Rapeseed prices followed, dipping by 16%.

Oilseed trade, as discussed earlier, is expected to grow by 20% over the coming ten years. Soybean exports are also expected to grow by 20%, with rapeseed trade only increasing by 11%. The lower growth in rapeseed exports is driven as much by limited supplies as any other factor. While soybean plantings grow by over 4 Mha over the period and production by 31 million tons, rapeseed plantings are up by less than 0.5 Mha and production by 5 million tons. Growth in domestic utilization in Canada and India alone are expected to rise by nearly 5 million tons.

Chinese demand for soybeans should be strong enough during the period to lift its' soybean import demand by 3.2 million tons. Mexico, the European Union and China together account for 76% of the projected increase in world soybean trade. In the product markets, soybean meal trade is expected to also rise by 21% with Argentina, Brazil and the United States continuing to dominate the exporters. European Union soymeal imports are expected to increase over the period, but not at the same rate as observed in the previous ten years. Competition from other feed and protein sources – due in part to the policy reform effort – should limit some of the growth in soymeal demand. A mix of several countries accounts for the increase in meal demand outside of Europe.

Figure 1-3: Wheat Prices

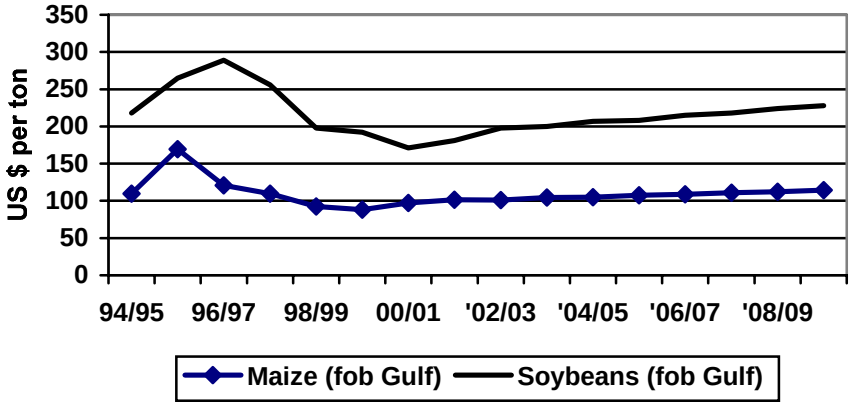


Wheat prices have obviously dropped significantly since the 95/96 market peak. Moving from $209 per ton (fob Gulf) in the 95/96 marketing year, prices are expected to average only $116 per ton (fob Gulf) for the 99/00 marketing year. Supplies coming somewhat more in line with demand in the 00/01 marketing year, wheat prices are expected to show something of an uptick moving to $119 per ton. Subsequently, prices are anticipated to continue to rise as production growth slows relative to demand. This will continue through the '02/03 marketing year, until world and European Union intervention prices converge and the ultimately the intervention price dips below world market prices. In this baseline projection, that is anticipated in the '03/04 marketing year. These increased supplies from Europe, coming to the market without constraint, should dampen wheat price rises in that initial year. Following that initial year, wheat prices should show further improvement as the rest of the world's producers are forced to deal with increased European wheat supplies.

Feed grain prices have been very depressed and, while expected to recover somewhat during the 00/01 marketing year, maize prices (fob Gulf) will hover around the $100 per ton range through the 02/03 marketing year. Prices are anticipated to improve only slightly during the subsequent period, reaching $115 per ton (fob Gulf) by the end of the projection period. Feed barley prices are expected to follow a similar pattern.

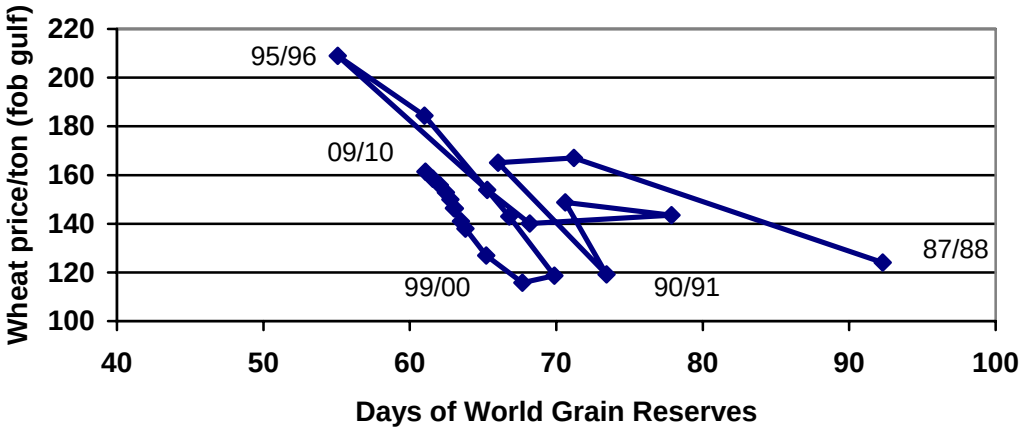
Oilseed prices will likely remain depressed for an additional one or two years when compared to wheat and feed grains. The increased supply in the United States is expected to drop prices even further in the 00/01 marketing year. Prices are not expected to return to even 99/00 levels until the 02/03 marketing year.

Figure 1-4: Maize and Soybean Prices



Of course, this projection is given using a **'normal' weather assumption**. In any given year, this particular assumption will likely be false. And the information contained in the global grain reserve levels is also telling. Policy changes in several countries around the world have certainly affected to degree to which prices react to changing stocks. In the mid-1980's, the United States and other countries also faced limited demand pictures. In several cases, but certainly in the United States and the European Union, one approach was to allow government controlled grain reserves to build. At the end of the '87/89 marketing year, world grain reserves were in excess of a 90 day supply with wheat prices down to $124 per ton. As the United States and other countries have extricated themselves from stock holding policies, the level of world reserves for a given price has also declined. Wheat prices for the '90/91 marketing year were less than $120 per ton, with only a 73 day supply. The '98/99 marketing year ended with less than 70 days in supply and a price of only $119 per ton. Given where markets have already been for the '99/00 marketing year it appears that a reserve level of only 67 days will produce a price of $115 per ton.

Figure 1-5: Wheat Price vs. World Grain Reserve



Many factors combine to give a price, not just reserve levels, but it does appear the reserves/prices graph shifted to the left with the 99/00 marketing year. Historically, those reserve levels would have suggested a wheat price $10 to $15 per ton higher. In any event, these are relatively snug supplies. Demand would surely adjust, but at constant useage rates, the difference in grain supplies between a 65 (projected '00/01 reserve levels) and a 55 day reserve (last observed in 95/96 with $209 per ton wheat) is only 3-4%. In short, these grain markets at the very least have the potential for some significant price moves with only modest supply changes.

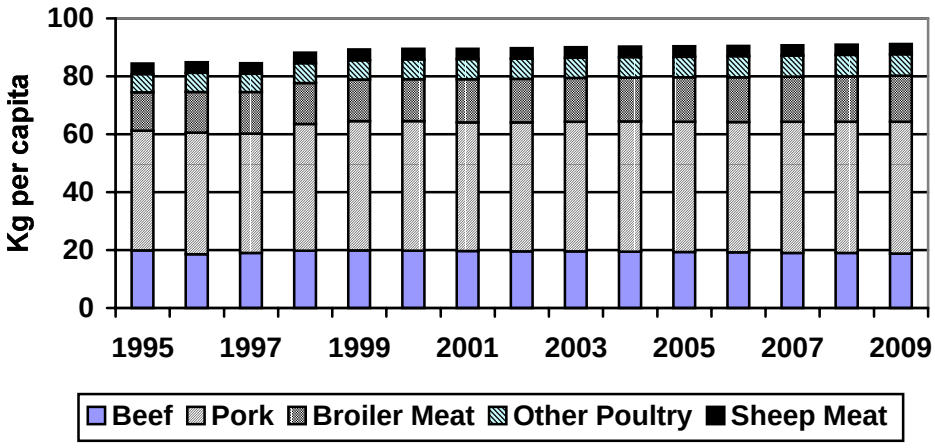
1.3 Beef and other Meat Markets

World trade in beef and veal is expected to rise by 23% over the coming ten years. Significant changes are expected however, among the various suppliers to the world market.

The reform in the European Union, as in last year's analysis, again makes export policy assumptions critical when discussing not only the European picture, but world trade in general. The reforms are expected to limit some of the growth in European beef production, while at the same time having positive effects on domestic utilization. Intervention stocks of beef were reduced significantly during 1999 and are expected to be zero at the end of 2000. The shift to private storage aids as part of the reform effort will preclude and future build-up of intervention stocks and thus will place more emphasis on commercial trade and exports of beef. At least some of the beef trade from the Union in this projection is expected to occur without the use of export subsidies.

The domestic market for beef in Europe is continuing to recover from past concerns. Per capita consumption of meat in total increased from just under 85 kg in 1995 to just over 89 kg in 1999, while at the same time, beef consumption had returned to 1995 levels. Much of the increase in meat consumption was tied to higher pork use, with broiler consumption also rising slightly. During that same five year period, beef per captia use dropped to a low of 18.5 kg in 1996. In short, it does appear that beef demand has recovered from its earlier difficulties. Total per capita meat consumption after increasing over the previous five years, is now expected to show very slow growth in the coming ten years. While the previous five years saw a 4 kg increase, the subsequent ten years are expected to display only a 1.9 kg rise. Continued declines in beef consumption, reflecting long, historical trends, will repeat past performance with increases in pork and broiler consumption. Broiler meat is expected to pick up 1.5 kg per capita with pork gaining only 0.9 kg per capita.

Figure 1-6: European Union Meat Consumption

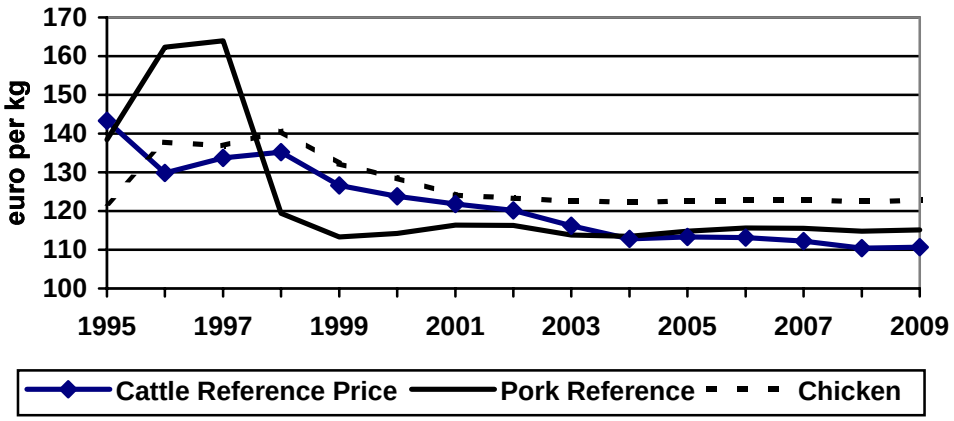


Suckler cow numbers are expected to fluctuate in the 11.6-11.8 million head range as the policy reforms, such as the change in quota, take effect. After 2002, numbers are expected to show a slight decline into the 11.5-11.6 million head range with a somewhat greater emphasis on heifers being eligible for

payments. Dairy cow numbers will continue their steady decline with production quotas being offset by increased production per cow. Together, this should put downward pressure on the supply of cattle available to the European Market. From a 112 million head level in 2000, total cattle numbers are expected to dip to 105 million by the end of the decade.

It is not the intent of this paper to go into detail on the country-by-country breakout within the Union, however United Kingdom cattle probably deserve special mention. Cow slaughter for meat purposes has been effectively zero for the last four years. As the Over Thirty Months Scheme (OTMS) is eliminated, cow slaughter in the United Kingdom is expected to return to earlier levels, over 600,000 head per year by 2004. This, combined with increased slaughter in other categories should boost total cattle slaughter by nearly a million head in 2003 when compared to 1997 levels. Similarly, live cattle exports are assumed to resume in 2000, reaching over 300,000 head by 2002. This increase from the United Kingdom is expected to be offset somewhat by the decline in cattle slaughter from Germany as their dairy herd also continues to contract. Given the size of the dairy herd in Germany relative to the suckler herd, the reduction in dairy animal numbers dominates the number of animals available for slaughter.

Figure 1-7: European Livestock Prices



Cattle prices will adjust with the change in beef policy in the Union. As intervention is removed, prices are anticipated to move down accordingly. By 2004, the cattle reference price is projected to dip into the 112 euro/kg level and hold in the 112-115 range through the remainder of the period.

Pork prices plummeted in 1998 compared to 1997 levels. Well understood by everyone in the industry, pork prices have remained somewhat depressed in Europe every since. Unfortunately, the projection here does not suggest significant improvements, but neither does it call for further declines in prices as feed costs adjust with the change in CAP provisions. The reduction in grain and other feed costs should allow a modest increase in returns, even with fairly static pork prices.

This background on European Union livestock production is important, given Europe's historical role in meat trade markets. With the reform, European producers, as already discussed, are expected to marginally reduce beef production and continue with historical reductions in beef consumption, albeit at a slightly slower pace. Pork production is also expected to increase with the decline in feed costs, but consumption is also expected to rise, with a similar story in poultry markets. In total, the Union is expected to have somewhat reduced supplies of beef for export markets, with a similar situation holding in pork and broiler meat.

At the same time European supplies are expected to adjust mainly to domestic markets, world trade in all of the meat categories is projected to increase. In the case of beef, world trade is expected to grow by 23% (728,000 tons) over the coming ten years. Much of this growth in trade, as well as the markets the Union and others are expected to leave, will be taken up by Argentina, New Zealand and the United

States. The United States is expected to become a net exporter of beef by 2004. Much of the growth in trade is expected to be taken up by Japan, Mexico and to a lesser extent by Russia. These three countries account for two-thirds of the expected growth in world beef trade.

Pork trade for the same time period is anticipated to rise by nearly a third from 1999 levels. Unlike the case in beef, Europe is not expected to see a decline in pork exports, nor is it projected to gain total shipments. Canada and the United States are projected to gain more than 90% of the increase in pork trade over the coming decade. Russia and Japan are expected to provide a significant portion of the growth in demand for pork imports, with a number of other countries also increasing their pork imports, but by lesser overall amounts.

The broiler export market is expected to grow by more than 37% in the coming ten years. Among the importers, China and Japan are anticipated to show some of the largest overall growth rates. The United States currently has a 57% market share in the broiler trade. Over the coming ten years, the United States is projected to capture over 80% of the increase in broiler exports, reaching a 64% market share by the end of the term. Brazil is also expected to increase its own trade, but its strong domestic market will likely limit the quantities it has available for export markets.

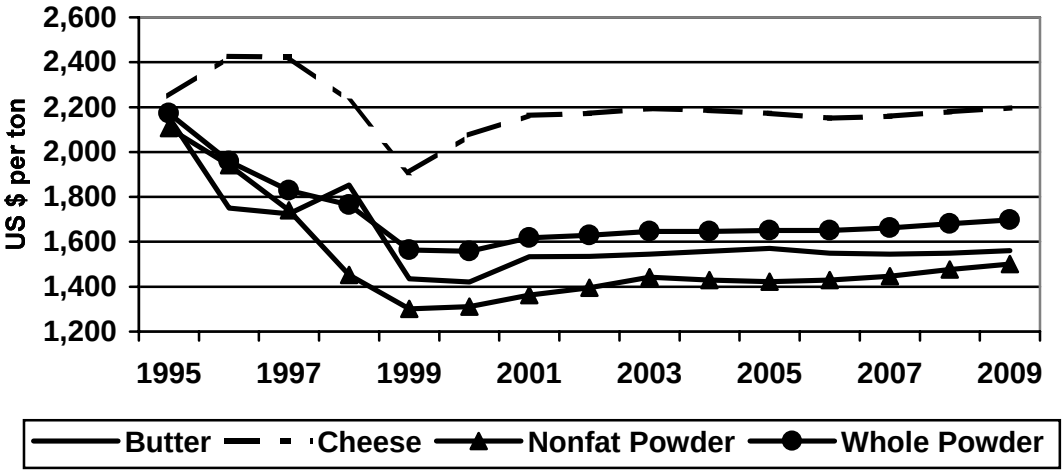
1.4 Dairy Markets

Overall, dairy markets are expected to maintain a strong domestic focus in most countries. Compared to overall domestic consumption in most countries, trade in dairy products is minimal. This is not the case in a few selected countries, New Zealand, Australia and Ireland being classic examples.

The policy reform process in Europe should lead to a marginal rise in milk production in the next few years. In some cases the country specific quota increases were already accounted for in over-quota production. Consequently, milk production is expected to grow by less than the 1.5% country-specific quota increase in the first few years of the reform. With the second round of quota, milk production increases, but again by less than the full rise in quota.

Even though the milk production increase in the short run is less than that allowed by the policy reform, milk prices in Europe will still face downward pressure. Milk prices dipped in 1999 relative to 1998 levels by 4%, and are anticipated to continue to slide by a further 1-2% over the next two to three years. With the further reform implementation beginning in 2005, milk prices should follow the decline in intervention. Price drops of 2-3% are expected in each of the three years the intervention prices are being reduced. After all of the provisions of the new reform are in place, prices are expected to average 15% below levels observed during the 1995-1998 period.

Figure 1-8: Dairy Product Prices (fob Price, North Europe)



During and subsequent to the reforms, Europe is expected to remain a major player in world dairy product trade markets. In butter trade, Europe should rank third behind New Zealand and Australia. In cheese markets, Europe and New Zealand should continue to confront one another, but particularly after the reforms are fully implemented, Europe is expected to remain as the worlds largest cheese exporter. Much of these exports will be of a commercial nature as well. In powder markets, Europe should be able to hold export levels as well, with New Zealand and Australia again picking up much of the increased market trade.

This cheese versus butter/powder trade story for Europe is due in large part to the expected shifts in milk utilization. Cheese markets are currently supported by the balance between supply and demand, and not through direct market intervention as is the case in powder and butter. With the change in intervention prices, butter and powder manufacture will be less profitable, suggesting at least a marginal shift toward the cheese markets for manufacturing use of milk. The limited movement on the butter and powder trade markets then from Europe is due at least in part to this limitation on supplies of product.

World butter and powder prices are anticipated to show some recovery from current levels. Rising income levels, and a greater reliance on New Zealand and Australian as opposed to European supplies will induce at least some increase in product prices over the coming decade. Cheese prices are also expected to rise over the period.

1.5 Summary

Much of production agriculture in the world is today witnessing depressed prices. This is certainly true in the grains, oilseeds and fibres markets and to a certain extent carries through into dairy and the pork sector. Offsetting some of these world price movements are government policies in selected countries. While the policy reform process has started in the Union, at least a portion of the fluctuations in world prices has been filtered out through protective tariffs and other policy tools. The United States has also protected its producers from at least some of the price volatility and has certainly taken steps to try to limit the income effect of these price adjustments over the last two years. It is expected by several that further action will be taken in the United States in 2000 as well.

Other countries however, such as Argentina, Brazil or Canada, are passing nearly all of the price adjustment back to their producers. In the case of Brazil in particular, macro economic factors such as exchange rates however, are complicating the picture in local currency terms. Given that not all producers will see these low commodity prices, it will probably take some time before the inherent stiffness in production adjustments will allow supply to come more in line with demand bringing prices to levels viewed as more reasonable from a historic perspective.

Cattle prices will adjust with the change in beef policy in the Union. As intervention is removed, prices are anticipated to move down accordingly. By 2004, the cattle reference price is projected to dip into the 112 euro/kg level and hold in the 112-115 range through the remainder of the period.

Pork prices plummeted in 1998 compared to 1997 levels. Well understood by everyone in the industry, pork prices have remained somewhat depressed in Europe every since. Unfortunately, the projection here does not suggest significant improvements, but neither does it call for further declines in prices as feed costs adjust with the change in CAP provisions. The reduction in grain and other feed costs should allow a modest increase in returns, even with fairly static pork prices.

Even though the milk production increase in the short run is less than that allowed by the policy reform, milk prices in Europe will still face downward pressure. Milk prices dipped in 1999 relative to 1998 levels by 4%, and are anticipated to continue to slide by a further 1-2% over the next two to three years. With the further reform implementation in beginning in 2005, milk prices should follow the decline in intervention. Price drops of 2-3% are expected in each of the three years the intervention prices are being reduced. After all of the provisions of the new reform are in place, prices are expected to average 15% below levels observed during the 1995-1998 period.

Wheat Trade

	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08	08/09	09/10
Net Exporters					(Million Metric Tons)						
Argentina	9.98	9.93	10.12	10.40	10.69	10.97	11.23	11.51	11.79	12.10	12.44
Australia	17.98	17.95	18.13	18.31	18.50	18.70	18.90	19.09	19.28	19.45	19.62
Canada	18.30	17.90	18.12	18.02	18.12	18.14	18.31	18.44	18.61	18.85	19.11
Czech Republic	0.03	-0.01	-0.15	-0.15	-0.14	-0.15	-0.16	-0.17	-0.18	-0.19	-0.21
Hungary	0.60	0.88	1.12	1.21	1.25	1.27	1.27	1.28	1.29	1.29	1.30
European Union	12.70	13.29	13.29	13.29	13.29	15.00	16.43	17.87	19.24	21.21	22.77
Ukraine	2.00	2.09	1.80	1.95	2.05	2.17	2.15	2.24	2.56	2.60	2.72
United States	26.38	27.83	28.57	28.92	29.79	29.72	30.06	30.33	30.59	30.86	31.14
Total Net Exports	87.96	89.88	91.15	92.10	93.69	95.97	98.36	100.75	103.36	106.38	109.10
Net Importers											
Japan	5.50	5.48	5.48	5.47	5.47	5.47	5.47	5.48	5.49	5.50	5.52
Russia	2.70	2.13	1.77	1.06	0.87	1.03	1.33	1.58	1.89	2.18	2.20
Other Former Soviet Union	0.68	0.88	1.43	1.78	1.96	2.01	2.10	2.20	2.27	2.35	2.46
Other Western Europe	0.43	0.39	0.38	0.39	0.39	0.41	0.42	0.43	0.45	0.46	0.47
Other Eastern Europe	0.50	0.75	0.63	0.70	0.81	1.01	1.18	1.36	1.54	1.70	1.87
Poland	0.20	0.57	0.70	0.81	0.90	0.97	1.03	1.07	1.10	1.11	1.12
Developing	76.45	78.14	79.10	80.24	81.65	83.42	85.16	86.94	88.93	91.37	93.75
China	0.20	0.97	1.33	1.53	2.31	2.53	2.88	3.20	3.46	3.75	3.99
High-Income East Asia	5.82	6.00	6.08	6.19	6.31	6.45	6.59	6.73	6.87	7.03	7.19
India	1.50	1.44	1.58	1.65	1.26	1.46	1.43	1.52	1.78	2.14	2.50
Pakistan	3.00	3.06	2.92	2.79	2.79	2.83	3.00	3.13	3.28	3.46	3.66
Other Asia	10.68	10.97	11.07	11.31	11.62	11.94	12.25	12.48	12.69	13.12	13.40
Brazil	7.00	7.14	7.18	7.21	7.24	7.29	7.35	7.41	7.49	7.56	7.64
Mexico	2.10	2.19	2.14	2.16	2.22	2.30	2.41	2.51	2.63	2.77	2.93
Other Latin America	8.37	8.69	8.64	8.69	8.81	8.98	9.17	9.36	9.58	9.81	10.09
Algeria	4.50	4.68	4.71	4.78	4.85	4.94	5.02	5.10	5.19	5.29	5.40
Egypt	6.70	7.07	7.06	7.06	7.06	7.07	7.08	7.09	7.11	7.13	7.15
Iran	6.50	5.65	5.70	5.80	5.92	6.06	6.19	6.33	6.47	6.62	6.76
Morocco	2.77	2.50	2.43	2.45	2.46	2.52	2.59	2.68	2.80	2.94	3.11
Tunisia	0.95	0.98	1.01	1.07	1.13	1.20	1.28	1.35	1.44	1.53	1.62
Other Africa/Middle East	15.95	16.35	16.76	17.03	17.11	17.24	17.28	17.35	17.42	17.46	17.50
Rest of World	0.42	0.45	0.48	0.52	0.56	0.60	0.65	0.69	0.73	0.77	0.82
Residual	1.51	1.51	1.51	1.51	1.51	1.51	1.51	1.51	1.51	1.51	1.51
Total Net Imports	87.96	89.88	91.15	92.10	93.69	95.97	98.36	100.75	103.36	106.38	109.10
Wheat Prices					(U.S. Dollars per Metric Ton)						
U.S. FOB Gulf	115.76	126.95	138.00	141.05	146.23	146.33	149.93	152.85	155.81	158.48	161.34
Canadian Thunder Bay	107.03	119.24	131.45	134.72	140.54	140.61	144.65	147.93	151.24	154.22	157.43
CIF Rotterdam	136.52	149.57	162.46	166.02	172.05	172.18	176.37	179.78	183.23	186.34	189.68

Maize Trade

	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08	08/09	09/10
Net Exporters											
Argentina	8.70	8.97	9.39	9.65	9.74	9.86	9.94	10.06	10.17	10.30	10.42
Hungary	1.50	1.66	1.62	1.65	1.65	1.65	1.66	1.66	1.66	1.65	1.64
Other Eastern Europe	0.46	0.39	0.73	0.68	0.84	0.80	0.86	0.81	0.76	0.66	0.59
South Africa	1.00	1.21	1.31	1.40	1.52	1.53	1.60	1.63	1.67	1.69	1.73
Ukraine	0.20	0.50	0.69	0.85	0.89	0.94	0.92	0.96	0.96	0.97	0.97
United States	50.32	51.46	52.14	53.99	56.44	57.95	59.53	61.15	62.81	64.75	66.51
Total Net Exports	66.68	67.29	67.77	68.48	70.15	72.74	74.51	76.28	78.03	80.02	81.85
Net Importers											
Canada	0.05	0.19	0.29	0.37	0.36	0.32	0.31	0.33	0.31	0.27	0.22
European Union	2.30	2.33	2.47	2.49	2.43	2.41	2.27	2.15	2.08	2.06	2.00
Czech Republic	0.08	0.08	0.07	0.06	0.05	0.03	0.02	0.01	-0.01	-0.02	-0.04
Poland	0.40	0.44	0.45	0.47	0.49	0.51	0.53	0.56	0.58	0.61	0.64
Israel	0.65	0.71	0.72	0.72	0.73	0.73	0.73	0.73	0.73	0.74	0.74
Japan	16.25	15.96	15.68	15.55	15.37	15.24	15.10	14.91	14.77	14.70	14.61
Russia	0.50	0.68	0.63	0.63	0.60	0.62	0.61	0.58	0.59	0.60	0.63
Other Former Soviet Union	0.04	0.06	-0.05	-0.02	-0.03	-0.03	-0.06	-0.07	-0.09	-0.13	-0.18
Developing	43.77	44.18	44.86	45.56	47.48	50.20	52.27	54.33	56.28	58.36	60.33
Algeria	1.10	1.15	1.22	1.29	1.36	1.44	1.52	1.61	1.69	1.79	1.89
Egypt	3.70	3.71	3.73	3.75	3.76	3.78	3.79	3.82	3.84	3.87	3.90
Other Africa	2.24	2.16	2.05	2.01	1.97	1.99	1.98	1.99	2.01	2.07	2.14
Other Middle East	5.45	5.33	5.39	5.44	5.45	5.50	5.53	5.56	5.59	5.63	5.66
Brazil	0.90	0.55	0.24	0.09	0.12	0.09	0.10	0.11	0.19	0.33	0.44
Mexico	4.95	4.92	5.11	5.18	5.34	5.52	5.67	5.80	5.92	6.08	6.28
Other Latin America	8.52	8.67	8.78	8.98	9.21	9.40	9.60	9.80	10.01	10.23	10.46
China	-4.50	-3.12	-1.90	-0.26	0.93	2.74	3.90	5.03	5.92	6.82	7.51
Indonesia	0.40	0.59	0.70	0.79	0.89	1.00	1.11	1.23	1.35	1.48	1.63
Malaysia	2.60	2.59	2.60	2.65	2.70	2.76	2.83	2.91	2.99	3.09	3.19
South Korea	8.50	8.59	8.67	8.78	8.86	8.93	9.00	9.09	9.17	9.25	9.34
Taiwan	4.50	4.77	5.10	5.23	5.28	5.39	5.49	5.60	5.69	5.81	5.93
Thailand	0.25	0.35	0.39	0.43	0.46	0.51	0.53	0.55	0.55	0.55	0.56
Philippines	0.15	0.25	0.24	0.26	0.25	0.26	0.26	0.27	0.29	0.32	0.36
India	0.25	0.32	0.36	0.36	0.55	0.53	0.57	0.59	0.63	0.60	0.60
Pakistan	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vietnam	0.05	0.06	0.04	0.02	0.02	0.02	0.03	0.05	0.07	0.11	0.15
Other Asia	0.27	0.25	0.27	0.32	0.33	0.36	0.37	0.39	0.41	0.43	0.45
Rest of World	0.10	0.11	0.11	0.13	0.15	0.16	0.18	0.20	0.21	0.23	0.25
Residual	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50
Total Net Imports	66.68	67.29	67.77	68.48	70.15	72.74	74.51	76.28	78.03	80.02	81.85
Coarse Grain Prices											
Maize (FOB Gulf)	87.97	97.31	101.39	101.24	104.46	104.95	107.41	108.88	110.93	112.28	114.51
Sorghum (FOB Gulf)	81.44	90.72	94.83	95.64	98.67	99.44	101.33	102.38	103.99	105.31	107.37
Barley (Portland)	108.00	120.95	122.94	123.56	127.41	128.47	131.55	134.24	137.50	140.49	144.38

Barley Trade

	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08	08/09	09/10
Net Exporters											
Argentina	0.03	0.01	0.01	0.02	0.02	0.02	0.03	0.03	0.04	0.04	0.05
Australia	2.70	3.14	3.38	3.49	3.55	3.58	3.61	3.63	3.65	3.67	3.66
Canada	1.66	1.42	1.39	1.40	1.47	1.51	1.49	1.42	1.49	1.63	1.78
European Union	11.30	10.00	10.05	10.13	10.48	10.61	10.83	10.91	11.01	11.10	11.21
Russia	-0.05	0.69	0.77	0.60	0.50	0.51	0.50	0.55	0.62	0.66	0.73
Ukraine	0.80	0.97	0.91	1.02	0.94	0.93	0.92	1.06	1.24	1.44	1.57
United States	0.11	0.10	0.12	0.08	0.11	0.11	0.15	0.17	0.20	0.21	0.22
Total Net Exports	17.31	17.31	17.72	17.92	18.15	18.46	18.79	19.13	19.72	20.35	20.97
Net Importers											
Czech Republic	0.23	0.16	0.19	0.21	0.24	0.26	0.27	0.28	0.28	0.29	0.29
Hungary	-0.10	-0.06	-0.13	-0.16	-0.17	-0.19	-0.21	-0.23	-0.25	-0.27	-0.29
Poland	0.10	0.07	0.09	0.11	0.13	0.17	0.21	0.25	0.29	0.32	0.35
Other Eastern Europe	0.03	-0.03	-0.05	-0.09	-0.12	-0.14	-0.14	-0.14	-0.13	-0.12	-0.10
Israel	0.70	0.71	0.72	0.72	0.72	0.71	0.71	0.71	0.71	0.70	0.70
Japan	1.40	1.30	1.26	1.24	1.23	1.21	1.20	1.16	1.14	1.14	1.13
Other Former Soviet Union	-0.67	-0.92	-0.96	-1.01	-0.92	-0.99	-1.05	-1.13	-1.22	-1.33	-1.46
Developing	11.59	11.85	12.30	12.55	12.78	13.08	13.36	13.66	14.19	14.74	15.28
Algeria	0.60	0.62	0.64	0.65	0.67	0.69	0.72	0.74	0.76	0.79	0.82
Other Africa	1.40	1.37	1.40	1.43	1.45	1.49	1.51	1.54	1.57	1.60	1.63
Saudi Arabia	4.70	4.88	5.08	5.14	5.21	5.29	5.36	5.43	5.70	5.96	6.22
Other Middle East	1.93	1.89	1.90	1.92	1.92	1.93	1.94	1.95	1.96	1.97	1.98
Brazil	0.10	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11
Mexico	0.10	0.10	0.10	0.10	0.11	0.11	0.11	0.11	0.11	0.12	0.12
Other Latin America	0.22	0.22	0.21	0.20	0.19	0.18	0.18	0.17	0.17	0.17	0.17
China	2.30	2.40	2.61	2.71	2.82	2.97	3.11	3.28	3.46	3.68	3.88
Pakistan	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Taiwan	0.15	0.16	0.17	0.18	0.19	0.20	0.21	0.22	0.24	0.25	0.26
Other Asia	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Rest of World	0.38	0.36	0.32	0.30	0.29	0.29	0.30	0.32	0.35	0.39	0.43
Residual	2.89	2.89	2.89	2.89	2.89	2.89	2.89	2.89	2.89	2.89	2.89
Total Net Imports	17.31	17.31	17.72	17.92	18.15	18.46	18.79	19.13	19.72	20.35	20.97
Coarse Grain Prices											
Maize (FOB Gulf)	87.97	97.31	101.39	101.24	104.46	104.95	107.41	108.88	110.93	112.28	114.51
Sorghum (FOB Gulf)	81.44	90.72	94.83	95.64	98.67	99.44	101.33	102.38	103.99	105.31	107.37
Barley (Portland)	108.00	120.95	122.94	123.56	127.41	128.47	131.55	134.24	137.50	140.49	144.38

Soybean Trade

	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08	08/09	09/10
Net Exporters				(Thousand Metric Tons)							
Argentina	2,300	2,074	2,229	2,469	2,545	2,668	2,731	2,856	2,942	3,059	3,157
Brazil	7,800	6,799	7,240	7,397	7,610	7,786	7,992	8,177	8,392	8,586	8,783
Canada	616	497	495	662	646	702	687	749	761	737	718
Paraguay	2,400	2,397	2,422	2,478	2,527	2,583	2,630	2,689	2,737	2,788	2,839
United States	23,460	26,807	28,331	27,597	26,971	27,161	27,406	27,842	28,114	28,604	28,930
Total Net Exports	36,580	38,565	40,714	40,609	40,296	40,902	41,441	42,304	42,944	43,757	44,409
Net Importers											
Eastern Europe	-4	122	180	209	233	254	275	295	317	338	361
European Union	14,614	15,709	15,896	15,760	16,008	16,044	16,273	16,288	16,465	16,543	16,714
Former Soviet Union	435	436	442	448	452	456	460	463	465	468	470
Russia	190	191	190	188	186	184	181	179	176	173	170
Ukraine	20	20	27	33	40	47	53	59	66	72	79
Other Former Soviet Union	225	225	226	226	226	226	225	225	224	223	222
Japan	4,600	4,640	4,641	4,634	4,636	4,635	4,639	4,638	4,640	4,641	4,634
Developing	11,700	12,200	14,081	14,207	13,544	14,058	14,223	14,876	15,141	15,654	15,875
China	4,200	4,675	6,476	6,501	5,739	6,166	6,237	6,800	6,975	7,389	7,503
India	0	0	0	0	0	0	0	0	0	0	0
Mexico	3,700	3,746	3,802	3,860	3,918	3,978	4,037	4,097	4,158	4,219	4,280
South Korea	1,500	1,323	1,352	1,377	1,406	1,430	1,453	1,476	1,495	1,526	1,565
Taiwan	2,300	2,455	2,451	2,469	2,481	2,485	2,495	2,502	2,513	2,520	2,527
Rest of World	6,403	6,625	6,641	6,520	6,591	6,623	6,740	6,912	7,083	7,281	7,523
Residual	-1,168	-1,168	-1,168	-1,168	-1,168	-1,168	-1,168	-1,168	-1,168	-1,168	-1,168
Total Net Imports	36,580	38,565	40,714	40,609	40,296	40,902	41,441	42,304	42,944	43,757	44,409
Prices				(U.S. Dollars per Metric Ton)							
FOB Gulf	192	171	181	198	200	207	208	215	218	224	228
CIF Rotterdam	219	199	208	225	228	234	235	242	245	251	255

Beef and Veal Trade

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Net Exporters					(Thousand Metric Tons)						
Argentina	332	342	379	397	413	424	433	444	457	479	487
Australia	1,217	1,219	1,218	1,229	1,239	1,248	1,252	1,253	1,245	1,234	1,219
Brazil	445	461	469	474	478	478	476	474	474	480	488
Canada	215	215	213	216	229	240	246	247	250	265	279
China - Mainland	65	83	85	80	71	58	44	34	26	22	18
European Union *	596	442	450	462	465	464	459	455	452	453	456
Hungary	8	7	7	6	4	3	1	-1	-2	-3	-4
Lithuania	5	6	12	13	13	11	9	7	6	5	5
New Zealand	418	434	447	456	464	470	471	472	470	469	466
Other Eastern Europe	0	6	8	9	8	5	2	-2	-5	-8	-10
Poland	24	29	28	23	18	14	10	7	6	5	5
Slovenia	3	3	3	3	3	3	2	2	2	1	1
Thailand	1	1	1	1	1	1	1	1	1	1	1
Ukraine	78	66	55	44	37	32	29	27	26	26	26
United States	-228	-277	-210	-103	-39	74	205	325	417	440	468
Total Net Exports	3,177	3,037	3,164	3,309	3,404	3,525	3,641	3,745	3,823	3,868	3,906
Net Importers											
Bulgaria	22	19	19	20	21	23	25	27	29	30	31
China - Hong Kong	48	48	49	50	51	53	55	57	59	61	62
Czech Republic	0	3	7	11	14	17	19	21	23	23	22
Estonia	1	1	1	1	1	1	2	2	3	3	4
Indonesia	12	14	16	18	20	23	26	30	33	35	37
Japan	972	966	981	998	1,013	1,040	1,072	1,110	1,141	1,153	1,157
Latvia	1	2	2	2	2	2	3	3	4	4	4
Mexico	223	307	360	420	429	431	415	402	393	394	408
Other Former Soviet Union	113	92	114	115	106	97	88	81	73	85	101
Philippines	75	71	75	81	88	97	107	116	123	128	131
Romania	1	1	1	2	2	3	4	4	5	5	5
Russia	495	364	408	455	499	534	554	562	564	561	558
Slovakia	-2	-1	-1	-1	0	0	0	1	1	1	2
South Korea	180	208	227	243	256	266	275	281	286	291	296
Taiwan	88	93	96	100	105	110	116	122	128	134	139
Rest of World	949	849	809	794	796	828	879	924	957	960	949
Total Net Imports	3,177	3,037	3,164	3,309	3,404	3,525	3,641	3,745	3,823	3,868	3,906
Nebraska Direct					(U.S. Dollars per Metric Ton)						
Fed Steer Price	1,445	1,544	1,625	1,666	1,679	1,644	1,577	1,518	1,481	1,492	1,526

* Includes meat and meat equivalent of live cattle trade.

Pork Trade

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Net Exporters					(Thousand Metric Tons)						
Australia	0	1	0	-1	-2	-3	-4	-5	-6	-6	-8
Brazil	76	81	80	78	77	78	80	80	80	81	82
Canada	505	658	740	789	799	778	745	761	782	754	711
China - Mainland	92	99	92	85	79	73	68	63	58	55	51
European Union	1,250	1,075	1,087	1,109	1,114	1,136	1,175	1,172	1,146	1,205	1,260
Hungary	53	59	59	57	55	54	54	53	52	52	52
Latvia	3	3	3	3	3	3	3	2	2	2	2
Poland	80	114	123	124	123	122	122	123	124	125	127
Other Former Soviet Union	12	16	19	21	25	27	30	33	35	31	26
Romania	-15	-13	-16	-20	-23	-25	-25	-25	-25	-26	-25
Taiwan	-55	-60	-54	-52	-49	-45	-38	-30	-20	-19	-19
Thailand	1	1	1	1	1	1	1	1	1	1	1
Ukraine	-2	-2	-3	-4	-4	-4	-3	-3	-3	-3	-3
United States	204	178	205	282	380	466	491	501	533	575	651
Total Net Exports	2,205	2,210	2,336	2,470	2,578	2,663	2,699	2,727	2,759	2,827	2,909
Net Imports											
Argentina	65	65	65	66	66	66	66	67	67	67	67
Bulgaria	1	-1	-2	-2	-2	-1	-2	-2	-2	-2	-2
China - Hong Kong	158	155	163	172	180	189	196	203	210	215	221
Czech Republic	12	10	13	12	12	14	14	13	13	13	12
Estonia	3	0	-1	0	0	1	1	1	2	2	2
Indonesia	0	0	0	0	0	0	0	0	0	0	0
Japan	814	795	824	860	896	935	946	959	971	1,011	1,059
Lithuania	2	1	1	1	1	1	1	1	1	1	1
Mexico	85	78	72	76	83	86	94	92	90	100	112
New Zealand	7	8	8	8	8	7	7	7	7	7	7
Other Eastern Europe	44	49	52	55	56	56	55	53	52	51	50
Philippines	13	12	14	15	15	15	15	16	17	17	17
Russia	349	389	456	520	559	574	573	570	571	572	576
Slovakia	32	33	35	38	39	41	41	42	44	44	45
Slovenia	16	16	17	18	19	20	20	21	22	22	22
South Korea	9	5	15	20	27	34	39	45	50	55	59
Rest of World	595	596	606	611	617	624	631	638	644	653	661
Total Net Imports	2,205	2,210	2,336	2,470	2,578	2,663	2,699	2,728	2,759	2,827	2,909
Iowa-Southern Minnesota					(U.S. Dollars per Metric Ton)						
Barrow and Gilt Price	750	842	934	960	943	895	855	931	1,001	951	884

Broiler Meat Trade

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Net Exporters					(Thousand Metric Tons)						
Australia	12	11	10	9	8	8	7	7	7	6	6
Brazil	700	737	753	765	778	797	816	835	853	870	888
European Union	538	529	538	545	548	552	556	562	567	572	577
Hungary	55	54	49	46	43	41	39	37	36	34	33
Slovenia	5	3	1	0	-1	-2	-3	-4	-4	-5	-6
Thailand	273	292	294	294	294	296	299	302	306	309	312
United States	2,099	2,129	2,256	2,411	2,601	2,732	2,835	2,927	3,019	3,132	3,249
Total Net Exports	3,682	3,753	3,902	4,070	4,272	4,423	4,549	4,667	4,784	4,919	5,059
Net Importers											
Argentina	35	37	37	40	42	44	45	46	47	48	50
Bulgaria	9	9	9	10	11	11	11	12	12	12	13
Canada	16	16	19	25	28	29	30	32	34	36	37
China - Mainland	499	499	527	553	582	617	649	678	707	736	766
China - Hong Kong	288	291	299	310	323	336	347	358	367	377	387
Czech Republic	5	6	7	8	10	11	12	13	13	14	15
Estonia	16	17	17	18	19	20	20	21	22	23	23
Indonesia	0	0	0	0	0	0	0	0	0	0	0
Japan	527	556	590	626	656	683	702	721	739	761	784
Latvia	12	14	14	15	15	16	16	17	17	18	18
Lithuania	9	9	8	9	10	10	11	11	11	12	12
Mexico	128	130	134	140	192	197	200	203	206	210	213
Other Eastern Europe	43	45	46	47	47	47	47	46	46	46	47
Other Former Soviet Union	84	85	84	84	83	83	82	81	80	84	90
Philippines	22	21	22	24	26	27	28	30	31	32	33
Poland	18	19	21	23	26	28	29	30	31	32	33
Romania	29	36	41	47	51	54	57	59	61	63	65
Russia	495	482	496	510	518	523	526	527	528	530	533
Saudi Arabia	245	246	242	241	240	239	237	233	230	230	230
Slovakia	0	1	1	1	1	1	1	2	2	2	2
South Korea	38	26	32	39	47	56	63	71	80	90	101
Taiwan	18	17	19	20	21	23	24	26	27	29	30
Ukraine	34	38	41	44	47	48	49	51	52	53	55
Rest of World	1,112	1,155	1,194	1,236	1,278	1,320	1,361	1,400	1,440	1,480	1,520
Total Net Imports	3,682	3,753	3,902	4,070	4,272	4,423	4,549	4,667	4,784	4,919	5,059
					(U.S. Dollars per Metric Ton)						
U.S. 12-City Price	1,281	1,260	1,265	1,256	1,243	1,233	1,227	1,229	1,231	1,230	1,230

Butter Trade

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Net Exporters					(Thousand Metric Tons)						
Argentina	8	6	4	4	5	6	6	7	8	9	10
Australia	88	105	109	114	119	123	127	131	136	143	150
Canada	6	7	5	5	7	8	8	8	8	7	7
Czech Republic	28	27	28	28	29	30	30	30	30	31	31
European Union	101	92	100	100	98	100	107	113	116	115	114
Hungary	2	3	3	3	3	3	3	2	2	2	2
New Zealand	279	326	324	328	328	328	328	328	327	328	328
Poland	2	-1	2	1	0	2	4	6	8	11	15
Ukraine	9	9	10	9	10	10	10	11	11	11	11
United States	-7	-8	-4	-4	-2	1	2	3	5	6	7
Total Net Exports	516	564	580	588	597	608	624	639	652	663	676
Net Importers											
Brazil	11	10	10	10	9	10	10	10	9	9	8
India	4	2	3	-2	1	9	21	21	19	17	19
Japan	0	2	4	6	7	8	9	9	9	10	10
Mexico	23	21	17	15	13	12	10	9	8	6	5
Romania	1	1	1	1	1	1	1	1	1	2	2
Russia	62	78	95	102	103	99	95	97	98	100	101
Switzerland	5	4	3	3	2	2	2	2	1	1	1
Rest of World	410	447	446	453	460	468	476	490	505	518	529
Total Net Imports	516	564	580	588	597	608	624	639	652	663	676
					(U.S. Dollars per Metric Ton)						
FOB Price N. Europe	1,435	1,421	1,534	1,535	1,545	1,558	1,570	1,550	1,545	1,550	1,561

Cheese Trade

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Net Exporters					(Thousand Metric Tons)						
Argentina	14	21	23	26	35	43	51	59	66	78	90
Australia	136	132	130	138	142	149	154	159	165	171	176
Czech Republic	3	4	3	1	-2	-3	-4	-4	-5	-6	-6
European Union	293	308	310	310	309	307	319	336	347	349	351
Hungary	8	13	15	15	16	16	16	16	15	15	16
New Zealand	240	246	268	282	290	299	305	309	314	319	323
Poland	14	16	12	10	8	6	5	5	6	5	4
Romania	0	-1	-2	-3	-4	-5	-5	-6	-7	-7	-8
Switzerland	30	36	37	38	40	41	43	44	45	47	49
Ukraine	2	-1	-2	-2	0	3	6	8	10	12	13
Total Net Exports	739	775	795	816	834	857	890	926	957	984	1,008
Net Importers											
Brazil	20	15	14	11	7	9	10	12	9	5	-1
Canada	0	-1	0	0	1	1	1	1	1	1	1
Japan	185	188	193	202	210	217	226	235	245	255	264
Mexico	25	35	35	44	55	63	75	86	98	109	120
Russia	40	42	52	54	53	53	57	62	67	72	77
United States	121	122	123	123	123	124	124	124	125	125	125
Rest of World	349	374	378	382	385	391	398	406	412	417	422
Total Net Imports	739	775	795	816	834	857	890	926	957	984	1,008
					(U.S. Dollars per Metric Ton)						
FOB Price N. Europe	1,909	2,075	2,164	2,172	2,193	2,185	2,172	2,151	2,160	2,179	2,196

Nonfat Dry Milk Trade

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Net Exporters					(Thousand Metric Tons)						
Argentina	22	27	24	25	27	28	30	31	33	35	36
Australia	236	215	221	226	234	240	247	255	264	275	287
Canada	40	32	26	23	23	23	21	18	16	14	11
Czech Republic	26	24	25	26	29	30	30	31	32	34	35
European Union	167	167	173	181	190	194	201	204	204	197	190
Hungary	-1	0	0	0	0	0	0	0	0	0	1
India	1	7	11	12	12	13	14	13	12	12	11
New Zealand	205	214	213	217	218	217	216	215	215	215	216
Poland	91	92	105	94	93	96	100	105	111	117	124
Switzerland	4	3	3	4	4	4	4	5	5	5	5
Ukraine	15	15	15	15	16	16	17	18	19	19	20
United States	104	107	101	98	68	68	68	68	67	67	67
Total Net Exports	910	902	916	921	915	929	948	964	979	991	1,004
Net Importers											
Brazil	53	41	42	40	36	36	36	35	34	31	29
Japan	50	59	70	75	77	77	76	74	72	70	70
Mexico	140	145	148	151	155	161	167	173	180	186	193
Romania	12	12	13	13	14	14	14	15	15	15	15
Russia	88	84	85	86	80	74	68	64	61	59	56
Rest of World	567	560	557	556	553	567	586	603	618	630	641
Total Net Imports	910	902	916	921	915	929	948	964	979	991	1,004
					(U.S. Dollars per Metric Ton)						
FOB Price N. Europe	1,301	1,311	1,362	1,396	1,442	1,429	1,423	1,429	1,447	1,476	1,501

Whole Milk Powder Trade

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Net Exporters					(Thousand Metric Tons)						
Argentina	125	135	136	138	141	146	152	158	164	170	176
Australia	137	141	139	140	143	148	153	159	165	172	178
European Union	517	513	503	505	507	508	511	517	518	518	519
New Zealand	362	358	388	402	416	427	435	443	450	457	463
Total Net Exports	1,141	1,148	1,166	1,185	1,206	1,228	1,251	1,276	1,298	1,317	1,336
Net Importers											
Brazil	121	96	111	115	120	117	114	111	109	107	106
Rest of World	1,020	1,053	1,055	1,070	1,086	1,111	1,137	1,165	1,189	1,210	1,230
Total Net Imports	1,141	1,148	1,166	1,185	1,206	1,228	1,251	1,276	1,298	1,317	1,336
					(U.S. Dollars per Metric Ton)						
FOB Price N. Europe	1,564	1,558	1,618	1,629	1,646	1,646	1,650	1,650	1,662	1,680	1,697

2 Agricultural Outlook for Ireland

Julian Binfield, Trevor Donnellan, Kieran McQuinn.
Rural Economy Research Centre,
Teagasc.

Introduction

This paper presents the agriculture sector outlook for Ireland. The results come from the simulation of the linked system of commodity models to produce ten-year projections of the key commodity variables, and overall sector income. The models are a system of econometrically estimated equations based on time series data. The methodology used follows that used successfully by FAPRI in the US and has been adapted for Ireland (Roche, 2000).

The results that are presented in this paper are for the **baseline** projection, i.e. the models are run assuming that current policy prevails throughout the projection period. Current policy incorporates the Agenda 2000 reforms, but does not include assumptions on any trade policy changes that might be the outcome of the Millennium round of WTO negotiations. No consideration is given for any growth in the number of member states in the EU that might occur over the period of the projection. In future scenarios these WTO and EU enlargement assumptions will be relaxed when we have knowledge of the timing and extent of these changes.

Under the baseline assumptions, figures from the FAPRI model of the EU, the EU Grains, Oilseeds, Livestock and Dairy (GOLD) Model, are developed and these projections are incorporated into the Irish analysis. Macroeconomic projections for Ireland from the ESRI are also included.

In 1999 the total income of the sector, as recorded by the CSO, dropped dramatically. This was largely in order to support incomes in 1998, some of the direct payments that would normally have been paid in 1999 were brought forward to 1998. Low incomes were also a result of continuing depressed market conditions emanating from the Asian crisis and the economic collapse in Russia. Cattle prices fell in 1999, as did milk prices. In the sheep sector lamb prices and ewe premia are falling simultaneously. While pig prices recovered somewhat towards the latter half of 1999, it was nevertheless a particularly poor year for the pig sector.

In general the short-term outlook is positive, with a recovery in income projected for 2000 as payments return to their normal pattern, and some of the direct payment increases under Agenda 2000 come on stream. International commodity prices are set to pick up slightly due to a recovery in the economies of Asia, and to a lesser extent in Russia. In the longer term the ending of some BSE related supply control measures in the beef sector mean that price decreases are likely. While the quota system remains in place in the milk sector, the quota is increased and along with reduction in intervention prices, this will lead to a reduction in milk prices. Changes in support payments will partially offset these price reductions. Although the pig and sheep sectors do not experience changes in policy under Agenda 2000 they will be affected by the price drop in beef. In addition, pig prices will continue to be depressed by excess supply and reduced beef prices, although this is partially offset by decreased feed cost. In the cereals sector prices look set to remain depressed in the short run due to depressed international cereal prices. In the longer run, as international conditions improve, the EU will be able to export some cereals without subsidies, which will have a positive impact on price.

This paper includes a brief discussion of the underlying macroeconomic assumptions and the individual commodity outlooks are presented. Following a discussion of the input projections, the overall income projections are outlined. The baseline projections presented here assume no change in policy, but there are likely to be important policy developments over the period to 2007. A discussion of these, and the impact of different exchange rate paths is carried out in "Future Developments in Policies and Markets", the fifth paper in this publication. Detailed figures for the projections are included in Appendix A.

2.1 Macroeconomic Outlook

The most recent projections for the Irish economy[1] show very strong growth being maintained in the domestic economy for the duration of the projection period. In general national income is set to continue to grow at about 5 per cent per annum in real terms in the 2000-2005 time period. Inflation is set to run at an average of 3 per cent per annum for the same time period and unemployment is expected to average 5 per cent.

Projected increases for energy costs for the economy as a whole, are most likely to affect the agricultural sector through increased costs of inputs. Labour costs are also set to increase very substantially with most wage rate indicators forecasting very strong growth rates in remuneration levels. This will exacerbate the existing problem of labour shortages already experienced by many agricultural producers. With output prices set to remain relatively flat or increasing only moderately for the projection period the end result is a continuing squeeze on margins at current input application levels.

The exchange rates presented in Table 1 below are the baseline exchange rates used in the simulation. A strong recovery is projected for the euro against both the dollar and sterling over the projection period. These exchange rate paths are generated by Wharton Econometric Forecasting Associates (WEFA) and are those used by FAPRI in the USA in their international baseline results.

The increased importance of the dollar/euro exchange rate in the generation of the EU results has lead us to perform two alternative exchange rate projections as scenarios for the models. One of these exchange rates is the present ESRI forecast of the dollar/euro exchange rate path and the other is the assumption of parity between the euro and the dollar over the entire 2000-2007 time period. By comparing the results of these exchange rate scenarios with the baseline results, the sensitivity of the agricultural sector and the models is highlighted and quantified. The full results of the exchange rate scenarios are available in the fifth paper of the proceedings.

Table 2-1 outlines projections for the national economy from the ESRI as they affect the agricultural sector, along with the WEFA exchange rate projections.

Table 2-1: Macroeconomic Variables, 1998 and 2007, Baseline.

	1998	2007	% Change 1998 - 2007
Dollar/Euro	1.11	1.22	10
Sterling/Euro	0.67	0.75	12
	(1990=100)		
Wage Rate Index[2]	139	205	44
Energy Index	93	116	25

Source: WEFA and ESRI (1999)

In this paper all prices and values are expressed in nominal terms. Readers should be aware that cumulative inflation is projected by the ESRI to amount to 27% over the period 1998 to 2007.

[1] The Economic and Social Research Institutes (ESRI) "Medium-Term Review 1999-2005".
[2] Unit Labour Costs of Market Services.

2.2 The Outlook for the Dairy Sector

Reflecting the expectations of most commentators, milk prices declined in 1999. The standardised 3.7% fat manufacturing milk price was down about 3% on its 1998 level. This decline was due to a particular weakness in commodity markets, felt through 1998 and on into the first half of 1999.

While international dairy commodity prices dipped considerably in US dollar terms, due to the absence of import demand from Russia over the period, processors in Eurozone EU member states were somewhat insulated from these declines, by the progressive depreciation of the euro against the US dollar. The weak euro helped maintain the value of third country exports in euro terms and ultimately led the European Commission to reduce the level of export refunds. In the absence of these currency exchange rate movements, the decline in milk prices would have been larger.

In Ireland, milk deliveries in 1999 were up by less than 1% on 1998. There was a further increase in the butterfat content of the milk delivered at 3.69%; 11 points over the national butterfat reference level. Incorporating the resulting butterfat adjustment, deliveries were about 4 million gallons under the quota on a calendar year basis in 1999.

At 1.278 million, the national dairy cow herd, as measured by the CSO June 1999 enumeration, was down almost 30,000 head or 2.3% on 1998. After a period through the early and mid 90's, in which dairy cow numbers remained relatively static, it now seems that the downward trend of earlier years has resumed. In 1999, costs were up about 3.5% on 1998 representing an increase in forage feed and non-feed related costs. Overall margins in dairying for the year are estimated to have been down 9% on 1998 (Fingleton 1999).

The year 2000 is the first year of the Agenda 2000 Agreement, which will run until 2007. The dairy element of the Agreement has resulted in a set of reforms, which will be introduced for the most part over the period 2005/06 to 2007/08. However, over the next two years Ireland, along with 4 other members, has been granted a *specific* quota increase. The increase amounts to almost 2.9% in the case of Ireland over the next two years, and the *specific* quota increases amount to a 1.2% increase at a wider EU level. From 2005, the *general* EU quota increase (1.5% for each of the other 11 members) will come on stream. In total, the change in EU quota will amount to an increase of 2.4% by 2007/08 relative to the 1999/2000 level.

The underlying assumptions of the baseline are that the euro appreciates to a value of $1.22 and that WTO Millennium round does not force further concessions by the EU on export refunds or other market management tools. A divergence from these assumptions would have implications for the dairy projections.

2.2.1 The Outlook for the EU

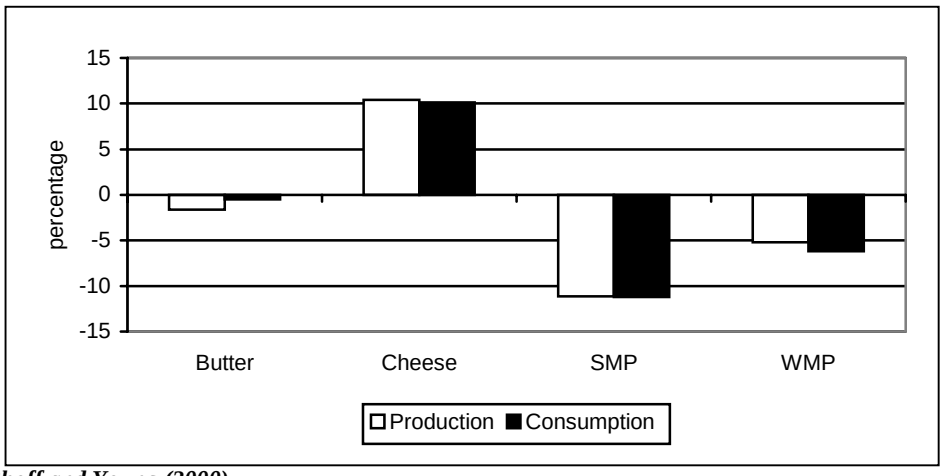
With exports representing such a high proportion of production in the case of Ireland, it is reasonable to assume that conditions in the EU market will exert considerable influence on the outlook for Irish dairy products. Movements in butter, cheese and SMP prices at EU level are reflected in movements in Irish milk prices. So this discussion a consideration of the outlook for EU and world dairy markets.

Prospects for international dairy demand are now more favourable than they were a year ago. Demand in East Asia is beginning to recover, with some signs also of modest improvement in Russian import demand. A new factor which has emerged, and which must be taken into consideration in any assessment of future prospects in the EU, is the value of the euro relative to the US dollar. Although little over a year old, thus far it has displayed a level of volatility and continuing weakness, which is causing an amount of concern. While adjustments in the value of export refunds can filter out some of this volatility, the path of the euro will nevertheless be significant in assessing future prospects for the dairy sector.

In this baseline analysis, it is assumed that the euro begins to recover in 2000 from its depressed position and appreciate gradually over the following two years to reach a sustained rate of $1.22 over the rest of the projection period.

The EU dairy product mix is set to continue to change over the projection period. This change is shown in. Under the Agenda 2000 Berlin Agreement, the reduction in intervention prices and the increased quota will result in declines in the price of dairy products and milk prices in the EU. A considerable shift in product mix is projected at EU level over the 1998 to 2007 period. This largely reflects the continuing upward trend in cheese production and consumption. The rate of increase in cheese consumption is projected to be lower in this decade than in the 1990's running at close to 1% a year on average rather than the 2% experienced in the 1990's.

Figure 2-1: Projected Percentage Change in EU Product Production from 1998 to 2007.

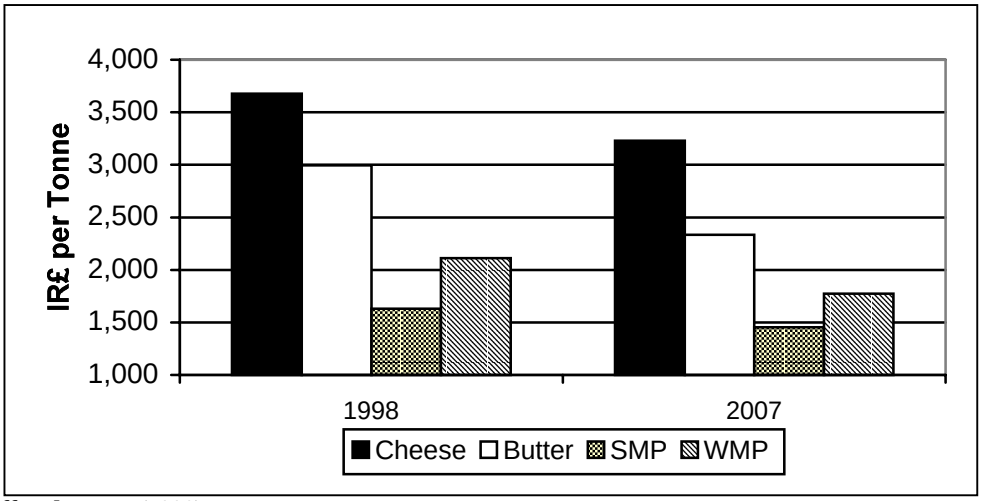


Source: Westhoff and Young (2000).

In the baseline analysis, following the reforms agreed in Agenda 2000, it is projected that the price of butter will be down almost 22%, the price of cheese down 12%, the price of SMP down 11% and the price of WMP down 16% on 1998 levels by 2007. Overall, relative to 1998, this results in a 15% decline in the EU average farm milk price by 2007.

The EU wholesale price outlook for the main dairy commodities is shown in Figure 2-2.

Figure 2-2: EU Average Dairy Product Prices 1998 and Baseline Projections for 2007.



Source: Westhoff and Young (2000).
Note: Prices shown are an EU average converted to Irish Pounds and do not necessarily reflect prices received by Irish processors

2.2.2 The Outlook for Ireland

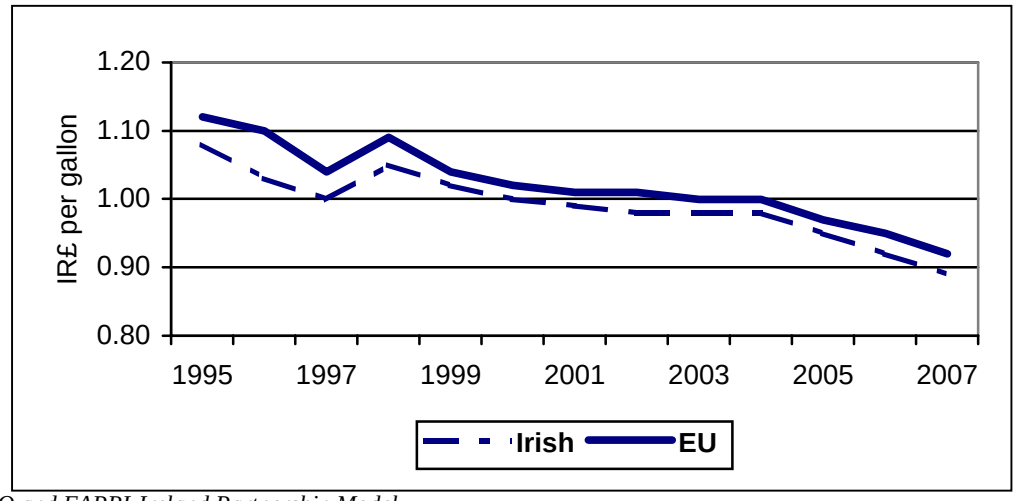
At a product level, the Irish dairy sector is different from the sector generally in the EU. Ireland is more heavily dependent on production of the intervention products, butter and SMP, than most other EU countries, where cheese production is more dominates. In determining the Irish milk price in this analysis, allowance is made for the specifics of the Irish product mix.

As evidenced in the previous section, it is projected that the increase in quota and the reductions in intervention support have greatest implications for butter prices. The extent of the decline in SMP prices is more modest. Readers should note that recent prices for SMP have been particularly low due to poor demand in key markets and it is conceivable that improving demand conditions in importer countries could moderate the extent of decline in SMP prices caused by the CAP reforms

While conventional wisdom would have suggested that the percentage decline in Irish milk prices would be greater than the EU average, the analysis here suggests that this will not be the case. It is notable that significant price reductions are projected for cheese and WMP. Granted the projected reduction in butter prices is more than for the other commodities but this is counterbalanced by the less severe projected reduction in SMP prices. The result is that the product price reduction projected in this analysis does not penalise Ireland (to a greater extent than the EU on average) for its greater exposure to intervention products. This is because the decline in prices of non-intervention commodity type products is, on a weighted average basis, of broadly similar magnitude.

Figure 2-3 shows projections for the Irish producer milk price under the Baseline scenario. Under a continuation of Baseline policy, prices decline slightly from current levels out to about 2004 and then a more appreciable decline takes place as the bulk of the Agenda 2000 reforms are implemented.

Figure 2-3: Irish and EU Producer Milk Price (3.7% fat) under Baseline Assumptions



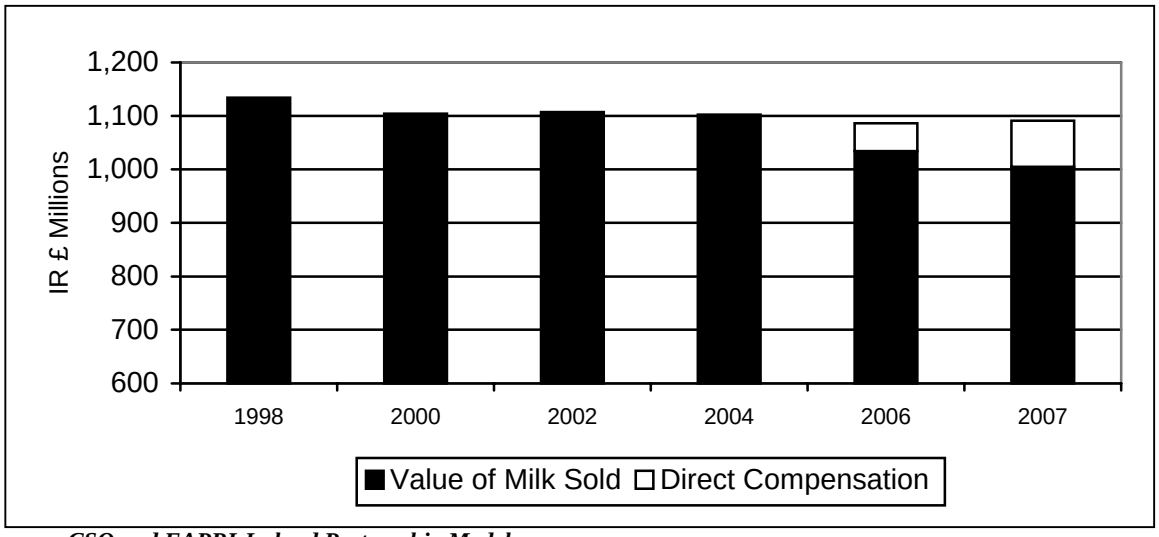
Source: CSO and FAPRI-Ireland Partnership Model.
Note: Milk price shown is standardised 3.7% butterfat (vat inclusive)

Under the terms of the Berlin Agreement, in 2001 and 2002 the Irish quota increase and the other specific quota increases are projected to lead to a modest reduction in Irish producer milk prices of the order of 2%. Further, more substantial, reductions in the Irish milk price occur from 2005/06 as the impact of increased quota and lower intervention prices across the EU feeds through to farm level milk prices. By 2007, the Irish milk price in the baseline analysis is projected to decline to 89p or 15% below its 1998 level. [3]

[3] It is also worth noting that if milk fat content increases with expectations, the extent of decline in the actual fat milk price will be smaller. Of course equally, the volume of milk that can be delivered at higher fat levels without attracting super levy would also decline.

A direct compensation package also forms part of Agenda 2000. Figure 2-4 shows the anticipated revenue accruing to the milk sector over the projection period on a calendar year basis.

Figure 2-4: Projected Irish Milk Sector Revenue[4] for selected years.



Source: CSO and FAPRI-Ireland Partnership Model

Rising in 3 equal steps from 2005/06, producers will on average receive 25 Euro (£19.70) per tonne (approx. 214 gallons.) of quota milk produced by 2007/08. This equates to a direct payment of about 9.2 pence per gallon of quota milk produced. Moreover, the increase in quota will provide an addition to the total revenue from milk sales.

There is a slight progressive decrease in milk sector revenue out to 2007 under the Baseline. In the early years of the projection, there is some decline in value of milk output following the allocation of the specific quota increases, but this is counteracted somewhat in aggregate terms by the growth in the volume of milk output. As a result, the value of the sector by 2004 is little affected by the policy change.

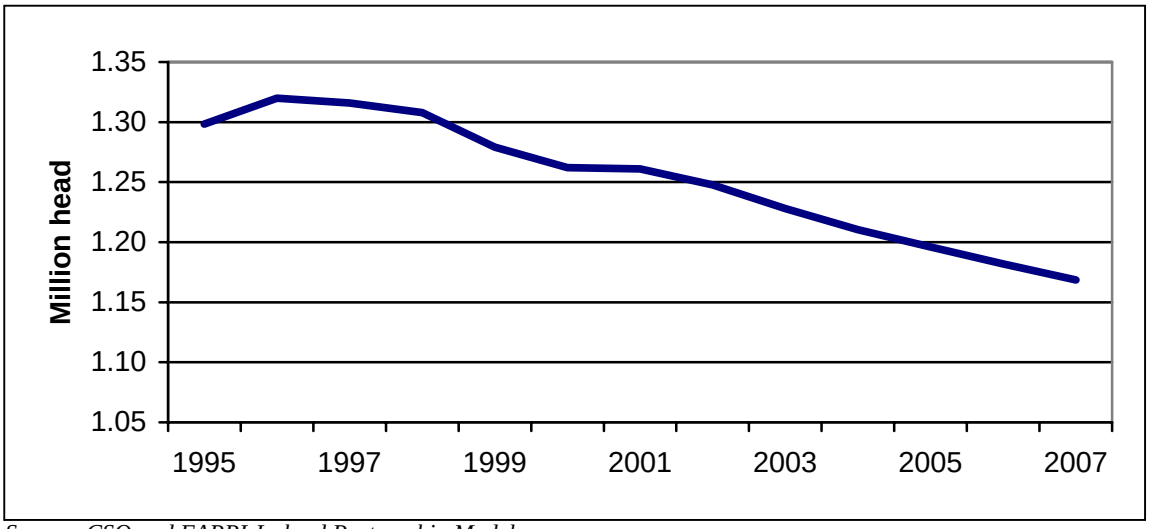
By 2007 the intervention price reductions and the general EU quota increases will be on stream, as will the direct payments package. So while the value of milk produced by the sector will decline more markedly at that point, much of this revenue decline is counteracted by the introduction of direct payments. By 2007 in the baseline analysis, sector revenue, which is shown in nominal terms, is down by less than 4% relative to 1998.

There are other implications for the sector in coming years in terms of milk yields, cow numbers, dairy product production, etc. Following a number of years of stagnation in the 1990's, a renewed increase in milk output per cow is anticipated of close to 1.4% per annum, with a consequential decline in dairy cow numbers. By 2007 dairy cow numbers are projected to be down 140,000 head on 1998 levels. The addition of a 2.9% quota increase under the Agenda 2000 Berlin reforms will temper the decline in cow numbers.

Projected dairy cow numbers are shown in Figure 2-5.

[4] Milk Sector Revenue = Value of Total Milk Output + Total Milk Direct Payments

Figure 2-5: Dairy Cow Numbers: Ireland 1995 - 2007



Source: CSO and FAPRI-Ireland Partnership Model

Over the projection period there is a shift in production out of butter and into cheese because the cheese price outlook is more favourable then that for butter. Unless there is a major structural shift in favour of cheese production as in the early 1990's, this change will be of modest scale.

On the domestic front, in spite of relatively static per capita demand for most dairy products, a projected 8% increase in population should provide impetus for growth in aggregate consumption. With a projected continuation in growth of per capita consumption of cheese, prospects for aggregate cheese consumption in Ireland are even more favourable.

Other factors, particularly on the beef side, will also play a role in determining dairy farm prospects in the next decade. The Berlin reforms will lead to a reduction in EU beef support prices, the introduction of additional slaughter premia and changes to extensification regulations, with consequential implications for cull cow and calf prices.

2.2.3 Dairy Sector Conclusions

Baseline projections show that by 2007 EU and Irish milk prices are set to decline by 15% on 1998 levels. In Ireland, a substantial portion of this decline is counteracted by the increase in milk quota and the introduction of direct payments to producers.

Readers should note that these projections were conducted under a specific euro exchange rate assumption. The key implications of alternative exchange rates for the sector are presented in the paper "Future Developments in Policies and Markets" in this publication.

The projections have been carried out on the assumption that the WTO commitments in place in 2001 are those, which prevail throughout the projection period, i.e. no assumptions are made about the outcome of the WTO millennium round. This analysis also assumes no further increase in EU membership.

All prices shown here are in nominal terms, so no allowance is made for inflation. It is projected that the cumulative inflation over the period 1998 to 2007 will be 27%.

2.3 The Outlook for the Beef Sector

Continuing pressure on margins meant that 1999 was not a good year for cattle farmers in Ireland. Beef prices fell yet again because of high supplies and the continuing depression of the Russian and other important markets. The poor weather conditions also contributed to the price-cost squeeze (Dunne, 1999). One significant development has been the large number of weanlings leaving the country destined for the feedlots of Europe. This, coupled with high slaughterings and reductions in cow numbers, should see a decrease in cattle supply pressures in the coming years. With intervention stocks now virtually non-existent, Irish beef will face less competition on world markets.

Developments on the EU market in 1999 have been favourable, with consumption of beef returning to levels that might have been anticipated in the absence of BSE, although the long run downward trend will continue. The ending of the calf processing schemes (CPAS) and Over Thirty Months Scheme (OTMS) mean that there will be an increase in beef production as these animals enter the food chain. The changes under Agenda 2000 mean that the market price will be able to fall, with the final level of prices determined by the EU Commission through the manipulation of export refunds. Of course any price reductions will occur in an environment of substantially increased premia.

The changes that have been made to the Common Market Organisation (CMO) in the beef sector under Agenda 2000 have been the most comprehensive of all the commodities. This is because very high stocks would have occurred without reform. Thus the beef sector reforms were passed without being substantially watered down, unlike the situation with other commodities. It is not only the level of the price support and payments that have been altered, but also the conditions under which premia are paid. Thus the impact of Agenda 2000 in the beef sector is difficult to model, so it is particularly important that our assumptions are clearly set out.

2.3.1 The Outlook for the EU

At first glance the situation in the EU beef sector appears to be much improved. Consumption has returned to its pre-BSE trend, intervention stocks stand very close to zero and subsidised exports are well below the GATT limit. Breeding herd numbers are no longer rising. This has been achieved largely as a result of the BSE related supply control measures implemented in the aftermath of the BSE crisis. CPAS has now ended, and this will result in an increase in the production of beef in the EU. The ending of the OTMS will eventually add to this addition of beef production, but it is not yet clear when this will occur. In the model it has been assumed that OTMS beef begins to enter the market in 2001.

The drop in the level of support prices means that the EU market price falls as a result of this increased supply in the FAPRI projections. In addition to this the Commission is assumed to reduce export subsidies and therefore stabilise the EU price at about 17% below its 1998 level. Of course the Commission could chose to run subsidised exports at a much higher level, with the market price drop not as pronounced. It may be more realistic to assume that export subsidies are reduced as the Commission may wish to reduce budgetary expenditure, or avoid higher internal EU prices in the period immediately prior to EU enlargement. There are many precedents of running subsidised exports below their maximum level; indeed that was the case in 1999.

There is a small reduction in the number of suckler cows. The impact of the changes in policy in the beef sector is hard to quantify and is discussed below. Despite the increase in dairy quota there is a significant drop in dairy cow numbers of two million. The resulting drop in cattle numbers and small drop in carcass weights results in a two per cent decline in production in 2007 relative to 1998.

Table 2-2: EU-15 Main Beef Variables 1998 and Baseline Projection for 2007.

	1998	2007	Change 1998 - 2007	% Change 1998 - 2007
		Euro/100kg		
Reference Price	135	112	-23	-17%
		'000 Head		
Beef Cows	11,633	11,611	-22	0%
		'000 Tonnes		
Production	7,624	7,469	-155	-2%
Imports	347	365	18	5%
Domestic Use	7,395	7,209	-186	-3%
Exports	692	625	-67	-10%
Intervention	514	0	-514	-100%

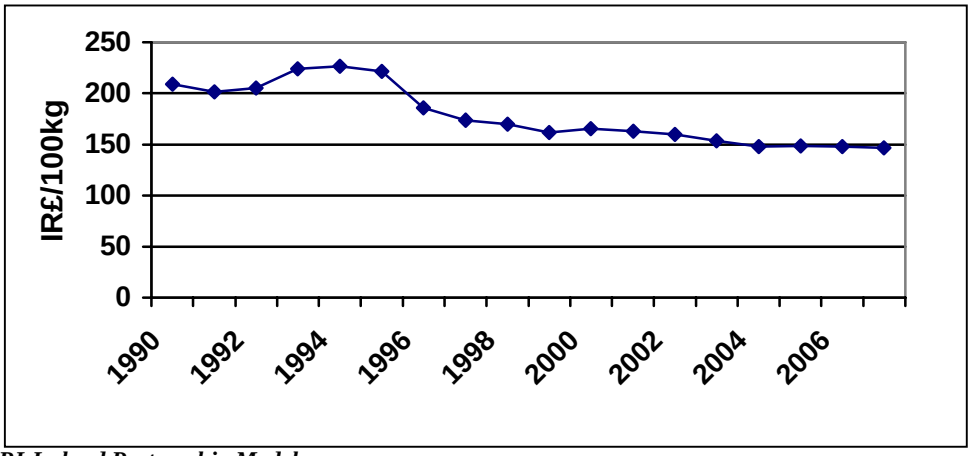
Source: Westhoff and Young (2000).

As noted above, the actual market conditions are very much reliant on the behaviour of the Commission. In particular, the price at the end of the period of the Berlin Agreement simulation is down 17 per cent. If the EU were to export the full amount that would be permissible under the current WTO Agreement then the price fall would be smaller.

2.3.2 The Outlook for Ireland

Recent years have seen the gap between EU and Irish cattle prices grow. There are a number of reasons for this and they have been discussed at great length (Dunne, 1999). We expect that there will be some recovery in the Irish price relative to the EU price over the next ten years, especially in a situation where the EU market was in balance as it is projected to be by FAPRI. The path that prices are projected to take under Agenda 2000 is shown in Figure 2-6.

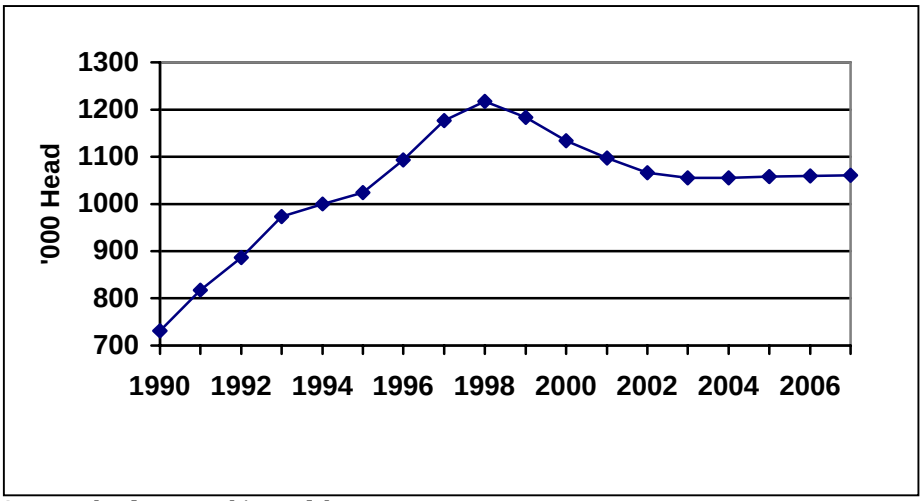
Figure 2-6: Irish Adult Cattle Price With Baseline Projections to 2007.



Source: FAPRI-Ireland Partnership Model.

The sharp fall in prices since the mid-1990s is shown in Figure 2-6. Falling prices at the EU level are reflected in the Irish market. Although there is some convergence between Irish and EU prices, the Irish price stabilises around 14 per cent below the 1998 level from 2002.

Figure 2-7: Suckler Cow Numbers With Baseline Projections to 2007.



Source: FAPRI-Ireland Partnership Model.

Projections for suckler cow numbers are shown in Figure 2-7. The number of suckler cows is projected to fall significantly from its 1998 peak. In the Berlin Agreement the suckler quota level is reduced marginally, but the major impact on cow numbers comes from a combination of the ability to be able to claim suckler cow premia on heifers and changes in stocking density criteria. This is the source of the major difference between the projections made in 1999 and those produced here. The adjustment has been made on the basis of:

i) Early returns of extensification forms to the Department of Agriculture that showed the number of claimants under the simplified scheme at 39% (Irish Farmers' Journal, February 19th, 2000).
ii) The survey in the Farmers Journal (February 26th, 2000) that showed 48% of suckler farmers surveyed intended to claim SCP on dry heifers.
iii) Cow culling rates and replacement levels.
iv) The advice of those involved in farming at a practical level.

In the latter periods, higher calf prices as a result of increased direct payments and continuing reductions in dairy cow numbers result in a levelling off of beef cow numbers.

The impact of the changes in prices and cow numbers on the sector in Ireland is summarised in Table 2-3. In the baseline, carcass weights fall due to a combination of lower prices and earlier slaughtering due to changes in the payments regime and the increase in importance of payments in income as a whole. Live exports have risen dramatically this year, and are projected to stabilise at their 2000 levels before falling as the gap between Irish and EU prices decreases.

The reduction in both dairy and beef cow numbers results in a drop in the volume of output over the simulation period. The value of output is down significantly. This is partly as a result of the reduction in the volume of output as outlined, some of which would have happened even if policy had not changed due to increasing dairy yields. The fall in prices, coupled with the further drop in carcass weights, means that the value of output that accrues to producers from sales to the market, drops by 25 per cent.

Table 2-3: Irish Main Beef Variables 1998 With Baseline Projections to 2007.

	1998	2007	Change 1998 - 2007	% Change 1998 - 2007
		IR£/100kg		
Adult Cattle Price	170	147	-23	-14%
		'000 Head		
Beef Cows	1,217	1,061	-156	-13%
Total Cows	2,525	2,229	-296	-12%
		Tonnes/Head		
Average Carcass Weight	0.306	0.287	-0.019	-6%
		'000 Head		
Live Exports	170	359	189	111%
Slaughterings	1,906	1,688	-218	-11%
Volume of Output	2,176	1,999	-177	-8%
		IR£ Million		
Value of Output (1)	1087	818	-269	-25%
Direct Payments* (2)	622	771	149	24%
Sector Revenue (1)+(2)	1,709	1,589	-120	-7%

Source: FAPRI-Ireland Partnership Model.
****Does not include REPS payments.***

The drop in the revenue that producers receive from the market is offset by an increase in the level of direct payments. Comparisons with 1998 are slightly misleading in this respect as the 1998 payments figure is inflated because some payments were brought forward from 1999. The total revenue of the sector is therefore down 7 per cent on the baseline in 2007 under the Agreement and back to 1999 levels if payments had not been brought forward. This is despite the fact that by 2007 there is a large fall in the size of the cattle herd in Ireland relative to its 1998 level.

This is only one possible simulation of the impacts of Agenda 2000. The Commission could alter its behaviour and a very different EU price path could result. In addition, changes in the structure in the beef industry in Ireland, a different factory pricing strategy, improved quality, or increased penetration of EU markets by Irish beef could result in a reduction in the gap between Irish prices and those in the EU.

2.4 The Outlook for the Sheep Sector

The recent downward trend in margins for sheep producers continued in 1999, with the continued depression of the skins market and a large carry-over in supplies contributing to a low price (Connolly, 1999). The failure of the ewe premia to compensate for price falls in both Ireland and the UK is well documented, and in this outlook we have assumed that the ewe premia stays in its current form.

Although there are no reforms in the Berlin Agreement that change the CMO for the sheep sector, the changes in the support for the beef sector will have consequences for sheep producers. The first of these is that the drop in beef prices will result in a decline in the demand for lamb. The most important changes to the sector may come about as a result of the impact of the new stocking density calculations and extensification payment regimes.

The outlook for the sheep sector differs slightly from that given in May 1999 mainly due to changes in the projections of ewe numbers. Firstly, the total numbers of ewes that are removed by the ewe de-stocking scheme has been reduced on the advice of the sheep review group. Secondly, the model has been re-

specified with the result that lowland ewe numbers fall considerably, partly as a result of the new extensification scheme and stocking density regulations.

2.4.1 The Outlook for the EU

An increase in supplies, partly as a response to the favourable prices in the sector immediately following the BSE crisis, has meant that prices have been depressed at an EU level. Information on breeding flocks in the EU indicates that there should be some contraction in supply, and therefore a recovery in prices in the sector. Price reductions for other meats, in particular beef, as a result of the Agenda 2000 reforms, mean that the projections do not show any increase in sheep prices. The result of this simulation by FAPRI for the main indicators of the sector is outlined in Table 2-4.

Table 2-4: EU-15 Main Sheep Variables 1998 With Baseline Projections for 2007.

	1998	2007	Change 1998 - 2007	% Change 1998 - 2007
		Euro/100kg		
Reference Price	326	332	6	2%
		'000 Head		
Ewes	70,253	69,312	-941	-1%
		'000 Tonnes		
Production	1,137	1,128	-9	-1%
Imports	238	234	-4	-2%
Domestic Use	1,377	1,359	-18	-1%
Exports	2	3	1	50%

Source: Westhoff and Young (2000).

The projected impact of Agenda 2000 on the sheep sector at an EU level is small. There are cross price effects from other meats on the price of lamb. If Agenda 2000 had not been implemented then the price would have been higher. Despite drops in per capita consumption, however, the combination of consumption and production leaves prices largely unchanged on 1998 levels. Production drops by just 1%.

2.4.2 The Outlook for Ireland

The potential for major changes in the sheep sector in Ireland comes from changes in stocking density calculations and extensification payments. There are two possible impacts from these sources. The first of these is that existing producers may be squeezed by the new requirements and would remove animals from their holdings. The second is that producers may wish to either enter the scheme or attempt to qualify for the higher payment. Another factor impacting on ewe numbers is the fact that they are relatively labour intensive, and therefore not suitable for the type of part-time farming systems that are likely to be increasingly popular.[5]

The main change over the outlook period, therefore, is the large reduction in the number of ewes in the country. The facility to claim ewe premia on dry ewes is assumed to remain in place, and there is therefore a significant impact on the volume of output. It should be noted that the figures above overstate the fall in revenues, as revenue previously claimed as headage and ewe premia will be claimed under other schemes not included in our direct payments. The figures do not include the large number of unrecorded slaughterings in the Republic that are alleged to be occurring. Current work on an "all-Ireland" sheep model should mean that developments such as these are captured in the future.

[5] For projections of farmer numbers see Downey (1999) and Dunne et al (1999).

Table 2-5: Irish Main Sheep Variables 1998 With Baseline Projections for 2007.

	1998	2007	Change 1998 - 2007	% Change 1998 - 2007
		IR£/100kg		
Sheep Price, 40-49kg	47	48	1	2%
		'000 Head		
Ewes	4,532	3,629	-903	-20%
Volume of Output	4,031	3,362	-669	-17%
		IR£ Million		
Value of Output (1)	163	139	-24	-15%
Direct Payments* (2)	117	93	-24	-21%
Sector Revenue (1)+(2)	280	232	-48	-17%

Source: FAPRI-Ireland Model.
****Does not include REPS payments.***

2.5 The Outlook for the Pigmeat Sector

Following the bleak experience of 1998, 1999 represented another crisis year for pig producers. The year began with pig prices of less than 70p per kg dw. A Russian food aid package, instigated in the first quarter, helped to lift prices to the 80p mark by mid-year. While prices did improve thereafter, they failed to reach even the 90p mark. Highest prices for the year occurred in the 3rd quarter due to the slaughterings necessitated in Belgium as a result of the dioxin scare. With the reduction of export refunds to Russia and the ending of Aids to Private Storage (APS), prices began to dip again towards the end of the year.

Taking the year as a whole, an average price of just 80p per kg dw was achieved. This represented a price reduction of almost 11% on 1998 levels, which were themselves over 20% down on the 1997 level. The deterioration in prices was such that they remained below the industry breakeven point for the second successive year. Losses incurred by Irish producers continued to mount as a result.

The weak euro over the course of the year had a beneficial effect on the euro value of third country pigmeat exports and ultimately led the Commission to reduce the level of export refunds. In the absence of this favourable currency exchange rate movement in 1999, the decline in prices might have been larger.

At 3.64 million head in 1999, the CSO estimate of pig output was virtually unchanged on the 1998 level. Slaughterings were up 10% on 1998. CSO estimates suggest that the number of breeding animals declined by some 3% although arguably a greater contraction should have been recorded at such depressed price levels.

The Agenda 2000 reforms will not have any direct affect on the pig sector. The impact of the Agreement will be felt indirectly through changes in the support for the beef and cereals sectors. The reduction in beef support prices has cross commodity consequences for the demand for beef substitutes including pigmeat. The projected fall in beef prices should have a depressing effect on the price of pigmeat. The reduction in cereal support prices will lead to a fall in pig compound feed prices. Although pigfeed represents a significant element in pig production costs, other costs associated with pig production are projected to increase, and this will temper the overall decline in production costs.

The assumptions underpinning the baseline results, are that the euro appreciates to a value of $1.22 and that the WTO Millennium Round does not force further concessions by the EU on export refunds or other market management tools. A divergence from these assumptions would have implications for the pig sector projections.

2.5.1 The EU Outlook

In response to the poor prices being experienced across the EU and in Ireland, there has been a reduction in the number of breeding animals. Preliminary indications are that sow numbers in the EU have dropped by 6% in 1999. The CSO December 1999 survey indicated a year on year reduction of close to 3% in breeding pigs in Ireland.

Following the expansion in production of the mid 90's induced by favourable prices (brought about due to concerns regarding beef consumption because of BSE and a swine fever outbreak in Taiwan), a situation of excess supply now exists across the EU. In the absence of a significant change in supply relative to demand, prices at an EU and Irish level are destined to remain depressed.

An additional factor which has emerged and which must be taken into consideration in any assessment of future prospects in the EU, is the value of the euro relative to the US dollar. While adjustments in the value of export refunds can filter out some of this volatility, the path of the euro will nevertheless be significant in assessing future prospects for the pig sector.

In this baseline analysis it is assumed that the euro begins to recover in 2000 and appreciates gradually over the following two years to reach a sustained rate of $1.22 over the remainder of the projection period. Under these circumstances, over the period considered here, EU pig output is to experience a period of little growth. EU pig prices are projected to remain relatively depressed. The projected shape of the EU pig sector is summarised in Table 2-6.

Table 2-6: EU 15 Main Pig Variables 1998 With Baseline Projections for 2007.

	1998	2007	% change
		Euro/100kg	
Reference Price	119.4	115.5	- 3.3
		000 Head	
Sows	12,328	11,899	- 3.5
		000 Tonnes	
Production	17,581	18,285	4.0
Imports	44	69	56.8
Domestic Use	16,380	17,098	4.4
Exports	1,045	1,253	19.9

Source: Westhoff and Young (2000).

While a particularly pronounced expansion of the EU pig sector manifested itself in record production levels in 1998 and again in 1999 a slight reduction is in prospect in 2000 and 2001. A period of modest growth is projected to follow in the remaining years of the projection. Against this background, prices are set to remain quite low.

2.5.2 The Outlook for Ireland

Table 2-7 shows the main pig sector variables for Ireland. In 2000 a modest recovery in pig prices is projected over 1999 levels. Lower beef prices under Agenda 2000 have knock on consequences for substitutes such as pigmeat. With prices weak in the EU, Irish prices do not return to the levels experienced earlier in the 1990's. Pig prices are likely to fluctuate around an average of about 86p per kg through the rest of the projection period.

Table 2-7: Main Irish Pig Variables 1998 With Baseline Projections for 2007.

	1998	2007	%change
		Irp/kg	
Irish Pig Price*	90	86	-4.4
		000 Head	
Volume of output	3,662	3,569	-2.5
		IR£ Million	
Value of output	212	206	-2.8

Source: FAPRI-Ireland Pig Model
Note: * Price of finished pigs at licensed curers

In the immediate term, there will be some contraction in the volume of Irish pig output. In spite of a projected reduction in input costs, baseline Irish pig sector output volume is expected to remain below the 1998 level over the years of the projection. There is little sign of an appreciable recovery in the value of output for the pig sector, with only a gradual improvement from the low 1999 levels in prospect. By 2007, in the baseline analysis, the projected output value of the pig sector at £206 million will be little different to the 1998 level. However, a weaker euro, or a more generous attitude from the Commission in relation to export refunds, would generate a more optimistic outlook.

2.5.3 Pig Sector Conclusions

Agenda 2000 will have only a modest affect on the pig sector. The more telling influences are unrelated to CAP reform. Excess supply within the EU is set to remain a key factor mitigating against an appreciable increase in prices. In this analysis, there is little prospect of sectoral growth in the medium term. Environmental legislation and animal welfare concerns will affect the sector. Given the volatility of the euro, the approach taken by the European Commission to export refunds will exert a strong influence on future prospects.

2.6 The Outlook for the Irish Crops & Inputs Sectors.

The prices faced by the EU cereals sector, and consequently the Irish cereals sector, are most sensitive to the exchange rate performance of the euro against the dollar than are the output prices of other sectors. The projected strong appreciation of the euro sees the date at which unsubsidised EU grain leaves the internal market being delayed and consequently results in internal EU prices remaining relatively depressed. The adoption, in this simulation of a stronger dollar/euro exchange rate is mitigated by the relative improvement in world grain prices compared with those envisaged in last year's FAPRI world analysis.

The overall the outlook for Irish grain prices, therefore, sees both feed barley and wheat prices in 2007 down about six per cent on 1998 levels. With a ten per cent compulsory set-aside assumed throughout the projection period total Irish cereal area planted is down about eight per cent in 2007 on 1998. Both wheat and barley planted areas are down considerably on 1998 levels with wheat area in particular seeing a significant reduction[6]. Yield improvements ensure that wheat production levels do not have the same rate of decline, while total barley production increases during the period.

Irish input consumption is principally affected by cheaper compound prices, and changes in the intensity of production in the Irish dairy and beef sectors. Reductions in dairy cow numbers along with reductions in stocking densities result in dairy feed consumption levels falling quite significantly, albeit from a historically high level in 1998. There is a similar fall off in the level of total beef rations. This is a combination of three factors - lower carcass weights, reduced stocking densities and a reduction in beef animals. Nitrogen application levels fall quite significantly throughout the projection period due to the reduction in intensity of

[6] Wheat area in 2007 is actually up marginally on 1999 levels.

dairy and livestock production and the reduction in total cattle numbers. Increases in farmer participation in REPS schemes are also likely to reduce nitrogen usage, along with other environmental restrictions. The quantity demanded of other input items remains relatively fixed, although increasing input prices results in an increase in expenditure for some of them.

Table 2-8: Summary of Results for the Irish Inputs and Cereals Sectors.

Commodity		Baseline	% Change
	1998	**2007**	**1998 - Baseline**
Area		000 Hectares	
Wheat	84	71	-16
Barley	191	179	-6
Prices		£/Tonne	
Wheat	78	74	-6
Barley	75	71	-6
		IR£ Million	
Total Cereal Receipts	201	196	-2
Of which :			
Market	113	106	-6
Payments	88	90	2
Feed Consumption		000 Tonnes	
Total Dairy	821	690	-16
Total Beef, Calf & Bull	1,000	893	-11
Nitrogen Application	425	367	-13
		IR£ Million	
Input Expenditure	1765	1689	-4

Source: FAPRI-Ireland Model.

2.7 The Outlook for Irish Agricultural Income.

The following section collates the results from the different sectors and consequently presents the baseline income situation for the 1998-2007 time period.

2.7.1 Gross Agricultural Output:

Gross Agricultural Output (GAO) is comprised of values for the livestock sectors (cattle, sheep, pigs and poultry), livestock products (milk) and the crops (cereals + other crops) sectors[7]. Table 2-9 summarises the baseline performance of the different sectors.

The baseline outlook, now fully incorporating the Agenda 2000 reforms, sees the value of the cattle sector drop substantially for the projection period. This can be attributed to a number of factors. Firstly, the large drop in dairy cow numbers reduces the number of calves entering the beef sector. There is also a reduction in suckler cow numbers. The volume of output within the cattle sector is down almost 10 per cent in 2007 on 1998 levels. The cattle sector witnesses a 13 per cent fall in the price of finished animals. The sector also sees carcass weights fall by 6 per cent due to the lower market prices. Cattle values in 2007 are therefore down 25 per cent on the 1998 levels.

In the Irish pig sector production is projected to remain close to current levels. A modest reduction in the breeding herd is projected in 2000 in reaction to the recent weakness in prices. From 2000 Irish pig prices begin to recover some of the ground lost on EU prices. However prices are set to remain considerably lower than recent historical levels over the projection period.

[7] The value of output refers specifically to the value of produce sold off the farm. It is exclusive of any subsidy or direct payment. These are included in revenues.

Table 2-9: Gross Agricultural Output 1998 With Baseline Projections for 2007.

	1998	Baseline 2007	% Change 1998 - Baseline
		IR£ Million	
Cattle	1088	818	-25
Pigs	212	208	-2
Livestock	**1687**	**1438**	**-15**
Milk	1134	1005	-11
Livestock Products	**1157**	**1031**	**-11**
Cereals	113	106	-6
Other Crops	314	346	10
Crops	**427**	**452**	**6**
GAO	**3270**	**2921**	**-11**

Source: FAPRI-Ireland Model.

The baseline outlook for the sheep sector sees the number of hill ewes falls significantly due to the "ewe scrappage" scheme. Lowland ewe numbers also fall due to competition for land from the beef sector. The overall reduction in sheep numbers results in the output values for the sector falling by 14 per cent.

Despite the increase in milk quota allocated under the Agenda 2000 reforms, the volume of Irish milk output increases only marginally in order to avoid quota superlevy payments. Much of the allocated quota increase is eroded due to an increase in the butterfat content of the milk. With milk output per cow projected to increase by 1.4 per cent per annum, total dairy cow numbers are projected to fall by 11 per cent in 2007. Because of the Agenda 2000 reforms, the Irish manufacturing milk price is expected to fall to 89 pence per gallon by 2007. Therefore the total value of the dairy sector falls by 11 per cent between 1998 and 2007.

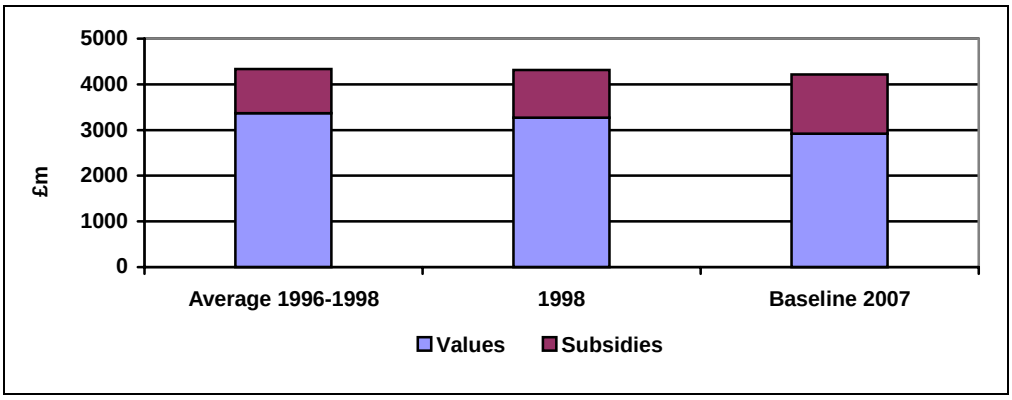
The output value of the cereal sector falls by six per cent. This is mainly a price phenomenon. Although total cereal area planted decreases for the period by eight per cent strong yield growth results in an increase in total production. The non-cereal component of the crop sector is expected to see significant growth. Values of other crops such as potatoes, sugar beet, fresh fruit and vegetables are projected to increase by 10 per cent thereby resulting in the total value of Irish crops sector increasing by six per cent.

The total value of Irish agricultural output is expected to fall 11 per cent over the next eight years. This is mainly due to the adoption of the Agenda 2000 reforms agreed last year, which are now fully integrated into the baseline analysis. The substantial effect of the reforms falls on the two most significant aspects of the Irish agricultural sector - cattle and dairy. In summary the effect of the reforms is expected to result in lower output prices and lower production levels for most of the CAP commodities.

2.7.2 Total Agricultural Revenues

Total agricultural revenue consists of total subsidies plus the value of output. The 1998 subsidy figure included payments brought forward from 1999 to offset some of the hardships incurred by the agricultural sector due to adverse weather and market conditions in 1998. This has the effect of inflating the 1998 figure when compared to that in 2007. An average value for total revenues for the years 1996, 1997 and 1998 is therefore included to achieve a more representative comparison.

Figure 2-8: Total Agricultural Revenues



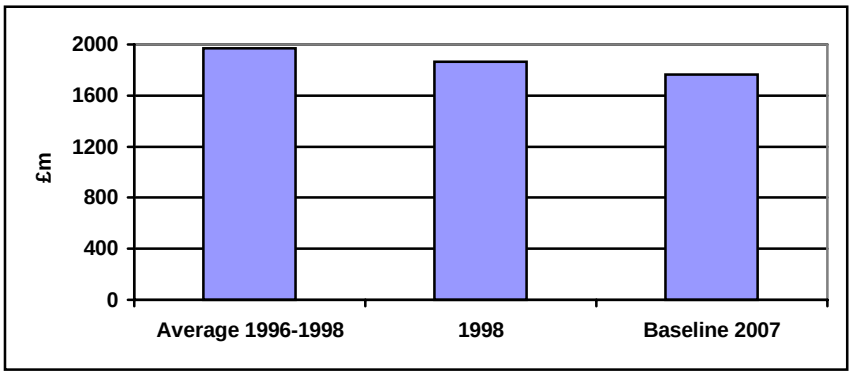
Source: FAPRI-Ireland Model.

Total baseline agricultural revenues in 2007 are down two per cent on 1998 levels and are down three per cent on the average of 1996 - 1998 values. The difference between the reduction in output values and revenue values is obviously due to the substantial increase in subsidy payments which were negotiated as part of the Agenda 2000 reforms. Total subsidies are set to increase by 25 per cent on the inflated 1998 level by 2007 and are up almost 35 per cent on the average of the 1996 - 1998 levels. Thus the increase in subsidy payments mitigates largely the substantial reductions in output value, which is projected to occur over the next eight years.

2.7.3 Agricultural Incomes

Table 2-9 shows that expenditure on Irish inputs is expected to fall by almost 4 per cent between 1998 and 2007. The reduction in this expenditure level is due in the main to lower application of fertiliser and lower levels of compound feed consumption in the beef and dairy sectors at lower prices. Thus, when the total revenue figure calculated above is combined with the inputs figure, overall income in Irish agriculture shows a drop of 3 per cent between 1998 and 2007. Figure 9 summarises the position. An average income figure for 1996 - 1998 is also included.

Figure 2-9: Agricultural Income



Source: FAPRI-Ireland Model.

As a result of the agreed reforms the ratio of subsidy payments to agricultural incomes increases significantly. In 1998 an inflated subsidy level represented 56 per cent of income. By 2007, it is projected that the subsidy level will account for 72 per cent of aggregate income. Clearly, from the producer's point of view, the major implication is the change in the composition of the revenue figure, which is likely to occur over the projection period. More and more of producer revenue is expected to come from Brussels and less and less is likely to come from the market place.

2.7.4 Agricultural Incomes in the "Celtic Tiger" Economy.

In October 1999 the ESRI published its latest medium term review for the overall domestic economy. In general economic growth is expected to continue at a rate of approximately 5 per cent between 2000 and 2005. However, the continuing strong growth of domestic GNP and GDP, combined with the gradual decline in agricultural income levels results in the ratio of agricultural income to national income levels declining significantly over the 1998-2007 time period. Table 2-10 summarises the position of agricultural income within the context of strong performance in the overall economy.

Table 2-10: Share of Agricultural Income in GNP and GDP.

	% 1998	% Baseline 2007
GDP	3.4	1.6
GNP	4.0	1.8

By 2007 agriculture's contribution to national income will have more than halved as agricultural income levels fail to keep pace with the rapid growth projected for the general economy. The results of the Input-Output model also published in these proceedings captures the overall contribution of the agricultural sector to the economy as a whole.

2.8 Conclusions

The past decade has seen rapid changes in the structure of the Irish economy. Macroeconomic growth rates, input costs and wage rates are all projected to grow quite strongly over the 1998 -2007 period. This, coupled with the changes made in Agenda 2000 means that the Irish agriculture and food sectors will operate in a significantly different environment in the new millennium.

The beef and dairy sectors are projected to see significant price reductions, although these are likely to be offset by increases in direct payments. Direct payments, as a proportion of overall farm income, are set to rise from already high levels. This will particularly be the case in beef, where we have already seen widespread restructuring of the sector in order to maximise payments, particularly in relation to extensification. Both cattle and sheep numbers are projected to decline considerably, resulting in less intensive production. This will have implications for input consumption, which in general will decline over the projection period.

The net effect of falling prices and increased payments, is a small decrease in overall sectoral income. The portion of this income that comes from payments is set to increase dramatically.

The projections that have been presented above have not incorporated any impact of WTO negotiations or EU enlargement. Pressures arising from these issues, along with budgetary pressures, were the driving force behind the Agenda 2000 reforms. Developments in these areas will undoubtedly influence the future path of the sector, and this is discussed in the fifth paper in this publication.

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APPENDIX A

Table A1 : Agricultural Output, Input and Income **Baseline**

Estimated & Projected Value IR£ millions (at current prices)

Commodity	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Livestock (incl. Stock changes)	**1686.9**	**1612.3**	**1618.2**	**1586.6**	**1526.6**	**1474.0**	**1447.3**	**1452.9**	**1449.0**	**1438.3**
Cattle	1086.7	1034.1	1007.4	967.8	913.0	865.3	835.2	835.7	830.1	818.1
Pigs	212.0	181.5	208.3	209.6	210.2	207.1	207.6	208.9	208.9	207.9
Sheep & Lambs	162.6	153.5	154.3	157.9	149.0	144.1	143.5	143.1	140.8	139.4
Horses	95.9	102.5	112.2	115.1	117.8	120.5	123.1	125.9	128.7	131.5
Poultry	129.7	140.7	136.0	136.2	136.7	137.1	137.9	139.3	140.4	141.4
Livestock Product	**1157.0**	**1116.6**	**1126.8**	**1130.2**	**1130.5**	**1126.8**	**1126.3**	**1091.1**	**1059.7**	**1030.8**
Milk	1134.1	1094.5	1103.8	1105.5	1106.5	1102.3	1101.7	1065.9	1034.0	1004.7
Eggs	15.9	16.0	16.2	17.2	17.2	17.8	17.7	18.1	18.5	18.9
Wool and other products	7.0	6.1	6.8	7.5	6.7	6.8	6.9	7.0	7.1	7.2
Crops (incl. stock changes & turf)	**426.5**	**443.3**	**422.7**	**421.5**	**425.8**	**431.6**	**435.1**	**440.4**	**445.6**	**451.9**
Barley	66.3	82.6	68.5	62.8	61.8	61.2	60.7	60.8	60.8	61.3
Wheat	40.4	37.4	36.9	36.9	38.5	40.0	38.9	39.1	40.0	40.6
Oats	5.8	4.3	4.2	3.9	3.8	3.9	3.9	4.1	4.2	4.4
Potatoes	61.2	54.1	54.5	56.2	56.5	56.7	57.1	57.5	58.0	58.4
Sugar Beet	58.6	61.4	59.3	59.1	58.7	58.8	58.8	58.8	58.7	58.6
Fresh Vegetables	132.3	132.9	128.3	130.2	132.3	134.1	136.6	139.3	141.2	143.1
Fresh Fruit	12.4	14.5	14.4	14.8	15.2	15.6	16.0	16.5	16.9	17.4
Other Crops	49.4	56.0	56.7	57.7	59.0	61.3	63.0	64.2	65.8	68.0
Gross Agricultural Output	**3270.4**	**3172.2**	**3167.7**	**3138.3**	**3082.9**	**3032.5**	**3008.7**	**2984.4**	**2954.2**	**2921.0**
Total inputs of materials and services	**1764.9**	**1749.5**	**1745.9**	**1718.9**	**1699.8**	**1685.7**	**1678.8**	**1680.1**	**1682.4**	**1689.1**
of which:										
Feeding stuffs	651.1	647.1	679.5	658.5	637.6	621.7	611.6	604.7	599.0	594.7
Fertilizers (incl. lime)	260.6	236.7	233.5	241.1	243.7	243.0	241.8	240.6	239.4	238.4
Seeds	68.0	54	52.4	52.5	52.6	52.6	52.5	52.4	52.5	52.5
Energy and lubricants	234.6	235	231.3	220.5	220.7	222.2	224.0	227.0	230.0	234.0
Maintenance, repairs, etc.	170.5	185	170.6	167.3	165.0	163.2	162.5	162.4	162.8	163.8
Services	124.4	137	129.9	129.8	130.2	130.5	132.1	134.0	136.5	138.8
Imports of store animals, poultry etc.	9.9	7	6.6	6.6	6.6	6.6	6.6	6.7	6.7	6.7
Crop protection products	51.1	47	46.2	47.1	48.1	49.1	50.4	51.7	52.7	53.7
Veterinary pharmaceutical products	82.5	92	85.3	85.0	85.6	86.0	87.0	88.3	89.3	90.4
Other (detergents, small tools etc.)	112.2	110	110.6	110.5	109.7	110.7	110.3	112.3	113.4	116.0
Gross agricultural product at market prices	**1505.6**	**1422.8**	**1421.8**	**1419.4**	**1383.1**	**1346.8**	**1330.0**	**1304.3**	**1271.8**	**1232.0**
Subsidies (e.g. livestock headage, T.B. and brucellosis eradication payments, area aid payments, etc)	1038	929.5	1038.3	1121.5	1221.6	1231.3	1222.2	1232.3	1263.9	1295.6
Agricultural levies (e.g. EU co-responsibility levy on sugar beet, disease eradication levies, etc.)	26.3	30.6	30.5	29.8	29.1	28.5	28.2	28.2	28.2	28.1
Gross agricultural product at factor cost	**2517.3**	**2321.6**	**2429.6**	**2511.0**	**2575.5**	**2549.5**	**2524.0**	**2508.4**	**2507.5**	**2499.4**
Depreciation	454.7	487.2	468.2	466.7	463.3	459.4	456.6	454.8	453.7	453.2
Net agricultural product at factor cost	**2062.5**	**1834.4**	**1961.4**	**2044.3**	**2112.2**	**2090.1**	**2067.4**	**2053.6**	**2053.8**	**2046.3**
Wages & Salaries (incl. employers' contributions to social security)	195.3	196.8	209.1	213.5	217.7	221.4	225.8	229.8	234.0	237.4
Land Annuities	1	1	1	1	1	1	1	1	1	1
Income from self-employment and other trading income	**1866.3**	**1636.5**	**1751.3**	**1829.8**	**1893.5**	**1867.7**	**1840.6**	**1822.8**	**1818.9**	**1807.9**

Table A2: Projections for key commodity variables under baseline assumptions

Milk		**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
Milk sold off farms	mill. litres	4,944	4,973	5,040	5,100	5,110	5,090	5,075	5,060	5,045	5,030
Milk used in farm households	mill. litres	49	48	47	46	45	44	43	42	41	40
Total milk output	mill. litres	4,993	5,021	5,087	5,146	5,155	5,134	5,118	5,102	5,086	5,070
of which:											
used for liquid consumption	mill. litres	541	551	558	564	570	576	582	590	597	604
used in the manufacture of:											
Butter	mill. litres	2,679	2,660	2,736	2,786	2,789	2,765	2,745	2,707	2,671	2,635
Cheese	mill. litres	963	981	997	995	995	995	996	1,006	1,015	1,024
Cream	mill. litres	259	271	250	250	250	250	250	250	250	250
Whole milk powder	mill. litres	299	262	275	275	275	275	275	275	275	275
Chocolate crumb	mill. litres	117	122	120	120	120	120	120	120	120	120
Miscellaneous products	mill. litres	134	175	151	156	157	153	151	155	158	161
No. of Dairy Cows	('000 Head)	1308	1279	1262	1261	1247	1228	1210	1196	1182	1168
Manufacturing Milk Price *	IR£ per gallon	1.05	1.02	1.00	0.99	0.99	0.98	0.98	0.95	0.92	0.89

Beef		**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
Adult Cattle Price	(IR£/100kg)	170.1	161.6	165.9	162.9	160.1	153.4	147.7	148.4	148.0	146.5
Weanling Price	(IR£/Head)	274.3	260.6	277.7	289.2	304.0	296.8	290.5	292.1	292.5	291.1
Beef Cows	('000 Head)	1217.4	1183.4	1133.6	1097.0	1066.3	1055.9	1055.9	1057.8	1059.7	1061.0
Calf Exports	('000 Head)	50.0	105.6	84.1	76.8	68.7	64.2	62.0	59.4	57.1	55.0
Adult Cattle - Europe	('000 Head)	103.0	237.2	279.5	259.8	250.7	230.8	232.3	232.3	232.4	232.9
Adult Cattle - World	('000 Head)	24.0	73.5	67.7	67.9	68.4	69.5	70.5	70.4	70.5	70.8
Cattle Carcass Weight (Non-Cow)		0.306	0.297	0.288	0.286	0.286	0.287	0.287	0.287	0.287	0.287

Sheep		**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
June Ewe Number	('000 Head)	4532.1	4350.0	4162.0	4102.2	3967.0	3850.0	3769.5	3708.2	3662.5	3628.7
Sheep Price, 40-49kg	(IR£/Head)	47.0	43.3	46.5	48.3	47.2	47.0	47.7	48.4	48.1	48.1

Pigs		**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
Output of pigs	(000 Head)	3,662	3,640	3,642	3,590	3,603	3,650	3,677	3,672	3,655	3,643
Price of Pigs	pence per kg	90	80	87	88	88	86	85	86	86	86
Pigs on farms Decmeber	(000 Head)	1,800	1,765	1,706	1,681	1,685	1,706	1,727	1,740	1,747	1,753

Cereals		**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
Total Cereal Area Planted	('000) Hectares	293.9	281.5	276.0	274.1	272.4	271.2	270.7	270.4	270.2	270.1
Total Barley Area	('000) Hectares	190.7	191.7	187.3	184.8	183.9	183.0	182.0	181.1	179.7	179.1
Total Barley Production	('000) Tonnes	1,073	1,185	1,198	1,190	1,189	1,189	1,188	1,187	1,183	1,184
Total Wheat Area	('000) Hectares	83.8	69.6	68.5	69.2	68.7	68.5	69.0	69.5	70.8	71.2
Total Wheat Production	('000) Tonnes	673.0	580.0	555.1	573.2	576.2	579.5	590.6	604.4	625.8	640.3
Feed Barley Price	(£/Tonne)	75.0	76.1	74.0	69.0	68.9	69.0	69.0	69.5	70.0	70.7

Inputs		**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
Total Dairy Feed	('000) Tonnes	821	870	859	845	816	780	751	727	707	689
Total Beef, Calf & Bull Feed	('000) Tonnes	1,003	1,277	1,206	1,144	1,083	1,028	983	947	917	893
Total Nitrogen Application	('000) Tonnes	425	441	396	391	385	378	373	369	366	363

3 Projected Farmer Response to the Agricultural Outlook for Ireland

Thia Hennessy
Rural Economy Research Centre
Teagasc

Introduction

The MacSharry reforms instigated a widespread restructuring of farming operations in Ireland. Under Agenda 2000 these reforms are widened and deepened and therefore further restructuring in response to policy change is expected. The work described in this paper focuses on the future of Irish farms and particularly their restructuring of operations in response to "The Agricultural Outlook for Ireland", which includes Agenda 2000 (Donnellan, Binfield and McQuinn 2000).

This paper will outline how the projected agricultural outlook will effect farms if there is no farmer response and current farming practises are continued. Following this, analyses on the likely response by farmers will also be presented.

As all farms cannot be modelled individually, farms were clustered into a number of homogeneous groups and the average representative farm for each group was modelled. Multi-period linear programming models were used to project the likely response of the representative farms. The following section explains both the representative farm approach and the linear programming models.

3.1 Representative Farms

Farms were chosen from the Irish National Farm Survey. As one farm type would not be representative of all farms nationally, it was necessary to develop a number of representative farms that characterise different groups of the farming population. Farms were clustered according to their *technological homogeneity*. This is defined as similar resource endowments and constraints, similar levels of efficiency and managerial abilities.

In projecting farmer response, it is essential to examine how farms have performed historically. Therefore, it is necessary to obtain farm data for a number of years. A panel of matched data was constructed from the National Farm Survey; i.e. the sample only contained farms that remained in the survey for a number of years. The sample taken was from 1992 to 1996.

The results of this clustering procedure for dairy and cattle farms are tabulated below. The tables show the main descriptors for the average farm in each cluster. The number of farms represented nationally is shown in brackets. The clusters have been named according to their most discriminatory characteristics.

Table 3-1: Description of Representative Dairy Farms

Descriptors as per 1996 *(No. of Farms Nationally)*	Static *(10 800)*	Developers *(7 900)*	Large *(1 000)*	Typical *(13 200)*
Farm Net Margin (£)	11 150	14 500	65 750	22 650
Utilised Agri. Area (hectares)	45	41	123	45
Milk Quota Farmed (gallons)	19 500	22 000	96 000	37 000
Change: Milk Sold (92-96)	0	+55%	+5%	+10%
Yield per Cow (gallons)	825	1 000	1 075	1 025

Source: Irish National Farm Survey

The population of Irish dairy farms is subdivided into the above four homogeneous groups. The first two although of similar size, differ significantly on their development path over time and also on their

technical efficiency. The large group is differentiated from the other three, as the farms in this group are significantly larger. Finally the last is the typical dairy farm. Farms remained in this group because they did not have any significant distinguishing factors.

Table 3-2: Description of Representative Cattle Farms

Descriptors as per 1996	Off-Farm Employment		No Off-Farm Employment	
(No. of Farms Nationally)	Minimalist *(15 000)*	Efficient *(8 200)*	Large *(4,700)*	Moderate *(28 300)*
Utilised Agri. Area (hectares)	33	36	74	33
Family Farm Income (£)	1 900	7 250	18 250	5 071
Gross Margin per Hectare (£)	300	469	545	406
Change in Agricultural Area	-10%	+9%	+8%	+2%
Labour supplied Versus Required[1]	0.3	0.6	1.3	0.5

Source: Irish National Farm Survey

Table 3-2 shows the four representative cattle farms. The minimalist and developer farms are of similar size and have similar demographics. They both have off farm income and both households are described as young[2]. However, they are differentiated, as one is a minimalist farmer. The minimalist farmer derives a significantly lower income from the same resource base as the efficient farmer. Differences also exist in technical efficiency. It is important to segment these two farm types, as they are likely to follow different development plans. For the latter groups the operator of the farm does not have off farm employment. These two farms are easily differentiated by their size and efficiency. Demographics on these farms are also vastly different. The average age of the large farm operator is 48 and the household is young. In contrast 50% of moderate cattle farmers are over 60 years of age and in the majority of cases the household is old.

3.2 Structural Change in Representivity Clusters

Table 3-1and Table 3-2 show the number of farms represented by each cluster in 1996. However, due to structural change the representivity of clusters vary over time. It is possible to trace these changes historically and then to project the future representivity of clusters. This projection is based on the assumption that changes recorded in historical data shall continue in the future. It is important to note that projected changes are based on those occurring in the 1992-1996 period. Projections do not take account of the state of the future economic climate to the extent that future growth rates are projected to exceed those between 1992 and 1996. Since 1996, the national economy has improved immensely resulting in increased off farm opportunities. This may not be fully reflected in the following projections.

Table 3-3: Rate of Change in the Representivity of Dairy Groups

Population Change	Static	Developers	Large	Typical
1992 Representation	12%	12%	2%	74%
1996 Representation	34%	20%	3%	43%
2000 Representation*	51%	27%	4%	20%
2004 Representation*	59%	30%	4%	9%

Source: Irish National Farm Survey
** Projected figures*

[1] This variable reflects the amount of labour supplied on the farm relative to what is required given the size of farm operation. For example 0.3 shows this farm only requires 30% of the amount of labour it is actually supplying. In other words it is operating at only 30% of the standard level of labour efficiency.
[2] A household is described as young if the operator is less than 55 years of age and at least one other member of the household is under 45 years.

Table 3-3 shows the percentage of the dairy farming population represented by each group. The representivity of the typical farming group decreased by 31% from 1992 to 1996 while all the other groups have increased most notably the static cluster. These changes are projected out to 2004. The population of dairy farms moves out of the "typical" category mostly to downsize their businesses and become static farmers or alternatively to follow an expansion plan and become developing farms.

Table 3-4: Rate of Change in the Representivity of Cattle Groups

	Other Off-farm Employment		No Off-farm Employment	
	Minimalist	Efficient	Large	Moderate
1992 Representation	19%	10%	6%	67%
1996 Representation	23%	19%	8%	50%
2000 Representation*	27%	28%	11%	34%
2004 Representation*	30%	33%	13%	24%

Source: Irish National Farm Survey
** Projected Figures*

The above table presents similar analysis of cattle farming groups. Historically the number of "moderate" cattle farmers without off farm employment is diminishing. By 2004 it is projected that the balance in the population of cattle farms will have shifted, with 63% of cattle farmers having off farm employment. The composition of the full-time farming population is also projected to change, with the proportion of large farms increasing.

3.3 Linear Programming Models

Linear Programming (LP) models were constructed for each of the representative farms. LP is a method of constrained optimisation; it maximises an objective function subject to specified constraints. In relation to agriculture, LP can be applied to maximise farm net margin over a specified planning horizon, subject to the resources on the farm and policy regulations.

A set of multi-period linear programming models was constructed to analyse the representative farmer response. Models are multi-period in that they analyse each year of the projection period. Multi-period LP can demonstrate growth and development of a farm business over a number of years. They can, for example, demonstrate the cash-flow implications of different policy scenarios. LP can also optimise on technical efficiency levels. However, in this case optimisation on technical efficiency was not allowed. Standard efficiency improvements were assumed for all farms, e.g. 1.3% per annum increase in milk yields.

LP is normative; i.e. it indicates the *optimal strategy* for a profit maximising farmer. It does not project *actual farm strategy*. There are two reasons why the optimal strategy may not replicate the actual one. The first is a methodological issue and the other a farmer-specific issue. Methodological issues refer to problems such as perfect certainty and instantaneous response to new situations. The farmer-specific problem relates to the willingness and ability of the farmer to optimise. Reasons have been identified such as multiple goals, aversion to risk, lack of education, etc, as to why farmers may not be willing/able to optimise, (Flemming 1998). Many of these reasons can be modelled. However, others cannot and therefore the actual response to a policy scenario may not be the optimal one identified by the model. This inability to reach the optimal is termed the *'response deficit factor'.* Through historical validation of the model, it is possible to determine this response deficit factor and project it into the future. Based on this the future optimal outcome can be calibrated by the response deficit factor as a performance correction tool. This will enhance the postiveness (prediction ability of actual rather than optimal) of the projection capabilities of LP.

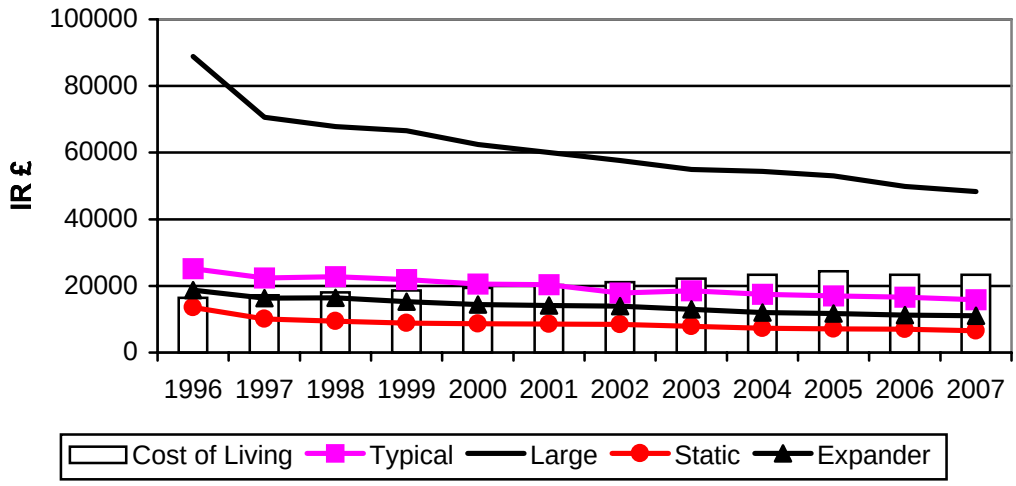
3.4 Farm Level Effects

The following analysis highlights the effects of the projected agricultural outlook for Ireland (Donnellan, Binfield and McQuinn 2000). These effects are static only. Static analysis assumes no response by the farmer to the new situation. Therefore it highlights the effect on farm net margin if current farming practises are continued indefinitely.

Figure 3-1 presents the results of static analysis for the representative dairy farms. Results are expressed in real terms to show the inflation effect on income. If there is no farmer response to the prevailing economic climate or new agricultural policies, net margin will fall considerably. To put farm margins in context the average cost of living of a rural household is also presented. In 1996, three of the four farms earned farm margins higher than the cost of living. In a no response situation farm net margin is below the average cost of living for three of the farms analysed. The gap between the cost of living and farm net margin of the large dairy farm diminishes.

Declines in net margin are mostly due to rising costs. Revenue, i.e. output value plus value of subsidies, is maintained as direct payments agreed in Agenda 2000 largely compensate for price decreases. With revenue remaining static and costs rising, farms are subject to a price-cost squeeze. This is particularly true in relation to fixed costs. Costs such as labour, energy, machinery, and maintenance of land and buildings are all projected to increase substantially. In relative terms farm net margin on the large farm is decreasing most rapidly. This is because large farms tend to have high overhead costs.

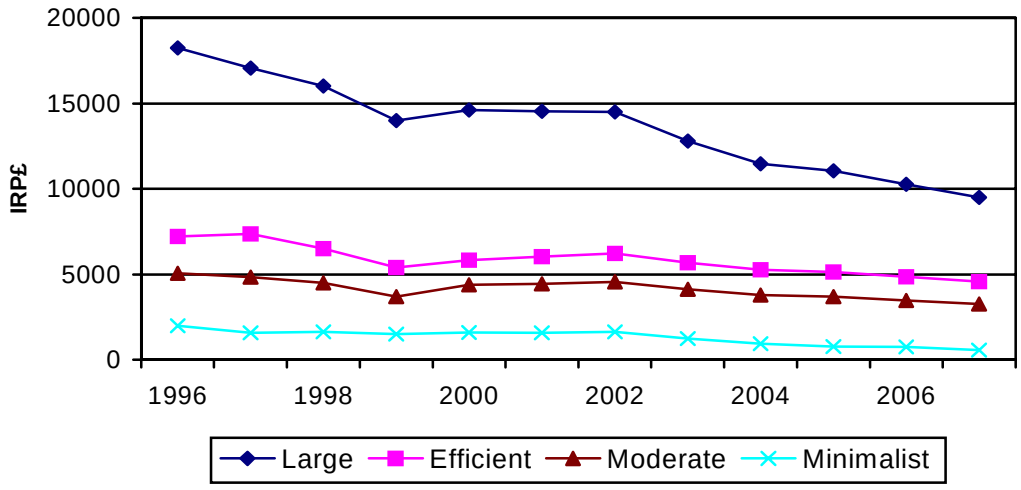
Figure 3-1: Real Farm Net Margin for Representative Dairy Farms: No Response



Source: FARPI-Ireland farm level model

Figure 3-2 shows similar results for cattle farms. Real farm net margins fall considerably over the projection period.

Figure 3-2: Real Farm Net Margin for Representative Cattle Farms: No Response



Source: FAPRI-Ireland farm level model

Again revenue is stagnating, however, increasing costs induce a negative effect on margins. Farms with off farm income experience greater reductions in margins. This again is attributed to rising fixed costs; generally these farms are farmed more extensively and therefore have high fixed costs per unit of output. With revenue stagnant and costs rising, the result is tighter margins.

3.5 Projected Farm Response

The previous analysis was static only; i.e. it assumed no farmer response/adjustment. However, on examination of historical data, it is apparent that farmers react to external forces such as policy change. Historically, it has been noted that response is usually in the form of optimisation. Following the MacSharry reforms farmers adjusted to the new policy environment by restructuring in order to maximise revenue per hectare (Dunne et al 1999). Linear programming models and historical trends have been used to project this response. These projections are outlined below. These figures are in nominal terms only.

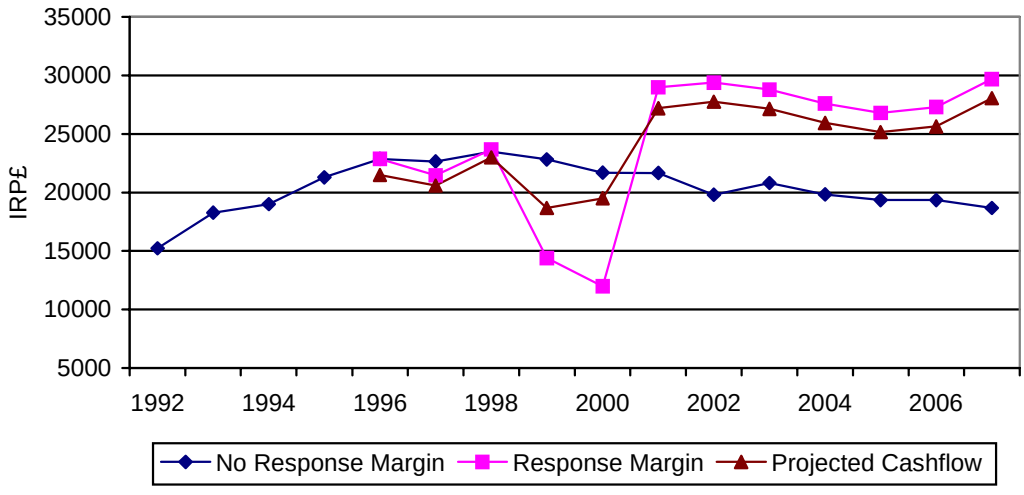
3.6 Dairy Farm Analysis

The agricultural outlook for dairy farms incorporates both changes from Agenda 2000 and recent changes in milk quota regulations. Response in relation to new quota restructuring is projected. Regulations with regard to allocation of restructured quota have not been finalised by date of publication; therefore it was necessary to make some basic assumptions. It was assumed that the 2000 price for restructured milk i.e. £1.36 would prevail in subsequent years. In relation to distribution, it was assumed that there would be three priority groupings. Top priority would be given to farms with a current quota of less than 35,000 gallons, second priority to those with quotas between 35,000 and 55,000 gallons. If any milk remains in the restructuring pool following this allocation then farms with a quota of 55,000 gallons or more may opt to purchase. Finally, an assumption was made that any farm leasing quota for longer than three years would be given the opportunity to purchase that quota.

3.6.1 Typical Dairy Farm

Figure 3-3 shows if there is no response to the new agricultural policy and the economic climate, farm net margin falls by approximately 20% from 1996 to 2007, in nominal terms. Through response it is possible to increase long-term farm net margin.

Figure 3-3: Typical Dairy Farm: Farm Net Margin and Cash Flow



Source: FAPRI-Ireland farm level model

In the base year 1996, the typical dairy farm has a milk quota of 32,000 gallons owned and 5,000 gallons leased. Based on historical trends it is projected that quota leased from 1996 to 1999 would increase by 1,000 gallons to 6,000. The cattle system of 1996 is continued. All steers are kept to 2 years and then sold for slaughter. In 1999 the farm net margin falls considerably. The reasons for this

are three-fold. Firstly, cattle margins were very poor in 1999. Secondly extra heifers are reared in anticipation of increasing the dairy herd. In addition to this, investment in housing is made, dry-stock housing is renovated to accommodate dairy cows.

In 2000 this farm avails of the new regulations with regard to quota transfer. The 6,000 leased gallons are purchased at £1.36. An additional 4,000 gallons are also purchased from the restructuring pool. Thus, the quota owned on this farm increases from 32,000 to 42,000 gallons. In the years 1999 and 2000 this has a negative impact on the farm net margin because of the associated investment. The purchase of quota and investment in housing requires a loan of £11,000, which is repaid over 7 years. As this farm would qualify as a priority grouping for any restructuring of quota it is likely that it would have access to an additional 4,000 gallons. If this farm does not have access to this quota in 2000, it is likely that it will have access to such a quantity of quota in subsequent years. It is projected that this farm will avail of the offer to purchase the quota that it is currently leasing.

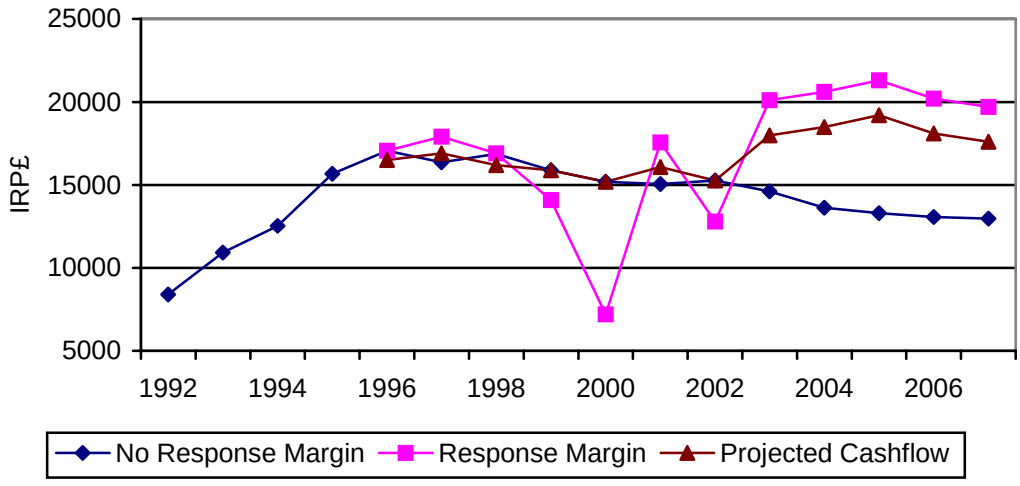
Farm net margin recovers dramatically following 2000. However, as a large investment has been made, it is more realistic to consider farm cash flow rather than margin. Net margin accounts for repayment of interest on borrowings only, cash flow on the other hand allows for repayment of principal and interest. Therefore, it may be considered a better measure of income. In 1999 and 2000, funds are borrowed to cover living expenses, this is reflected by the cash flow line on the graph. Following this, funds are repaid annually and thus cash flow does not increase by the same magnitude as farm net margin. It should be noted, however, that following investment in quota cash flow increases by 25% from 1996 to 2007.

From 1996 to 2007 this farm increases total quota owned by 30% and total quota farmed by 15%. As a consequence of this increase in quota, farm net margin increases by 30% in nominal terms and 11% in real terms. To put this increase in context, farm net margin in 2007 is 10% above the average cost of rural living in that year.

3.6.2 Developer Dairy Farm

For the developer dairy farm, if there is no response, farm net margin falls by approximately 25% from 1996 to 2007 in nominal terms. By responding to the new agricultural policies and economic situation it is possible to increase farm net margin, albeit not immediately.

Figure 3-4: Farm Net Margin and Cash Flow Developer Farm: Projected Response



Source: FAPRI-Ireland farm level model

In the base year 1996, this farm has a milk quota of 19,000 gallons with another 3,000 gallons leased. Based on historical trends, it is projected that quota leased from 1996 to 1999 would increase by 1,000 gallons to 4,000. The cattle operations are as 1996, all steers are kept to 2 years and then sold for slaughter. In 1999 the farm net margin falls for reasons similar to the last example.

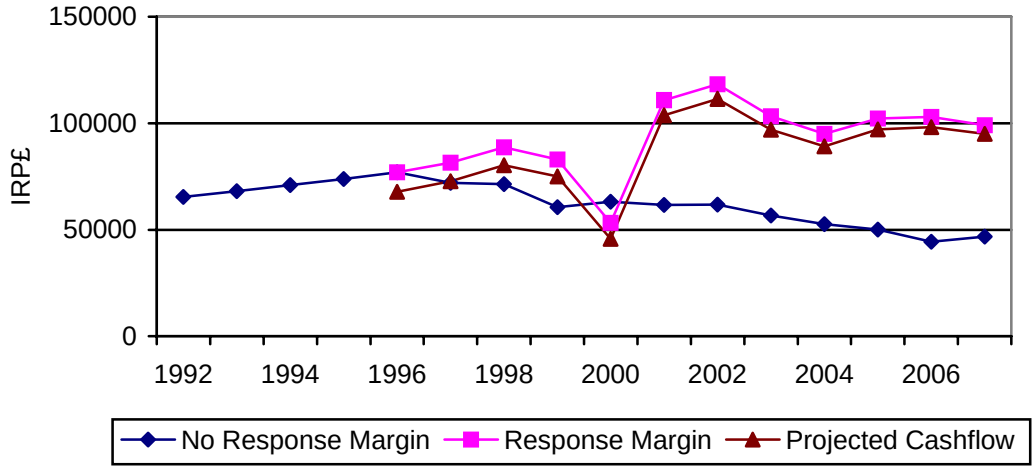
In 2000 this farm purchases a total of 9,000 gallons. This is an increase of 5,000 gallons of quota farmed. As this farm qualifies as a priority group, it is likely that it would have access to such a quantity quota. In the years 1999 and 2000 this has a negative impact on the farm net margin, as highlighted in . The purchase of quota at £1.36 and the conversion of housing require an investment of £10,000, which is repaid over 7 years. Again, farm cashflow may be considered more indicative of the expansion effect on income.

Farm net margin recovers in 2001. However, it falls considerably again in 2002. This is because further investment in quota is made. In 2002, 5,000 gallons of quota are purchased. This requires an investment of £3,000 for both the purchase and the associated housing costs. By 2003, 33,000 gallons of milk quota is being farmed. This is a 35% increase in quota farmed from 1996. The farm net margin is 21% above its 1996 levels, while cash flow is 12% higher. Cattle operations in these years are store rearing only. This is due to this system having a lower demand for housing and land.

3.6.3 Large Dairy Farm

Figure 3-5 shows, farm net margin falling by 30% in nominal terms, in a no response scenario. Through response it is possible to maintain long term farm net margin.

Figure 3-5: Farm Net Margin and Cash Flow Large Dairy Farm: Projected Response



Source: FAPRI-Ireland farm level model

In the base year 1996, this farm has a milk quota of 81,000 gallons owned and 15,000 gallons leased. From 1996 to 1999 the projected response is for this farm to continue leasing this 15,000 gallons and increase by 5,000 gallons. Thus, in 1999 this farm is supplying its owned quota of 81,000 plus 20,000 gallons of leased quota. This farm is selling both stores and finished animals. It is constrained by the 90-head limit on special beef premia.

In 2000 all leased quota is purchased at £1.36. As the farm earns such a large net margin it does not need to borrow any funds for this investment. The fall in net margin in 2000 is not overly dramatic. This is because some of the loss incurred is absorbed by the increase in special beef premia limit to 180 head. It is projected that this farm would acquire available quota. However, it would not qualify as a priority group. It is projected that the two priority groups could afford to acquire substantial quantities of quota, therefore it is unlikely that there would be any remaining available quota for such a large farm.

Through purchase of currently leased quota, it is possible to increase farm net margin. Farm margin begins to fall after 2003. This is due to falling cattle margins and milk prices. It recovers marginally later in the period as milk direct payments are introduced.

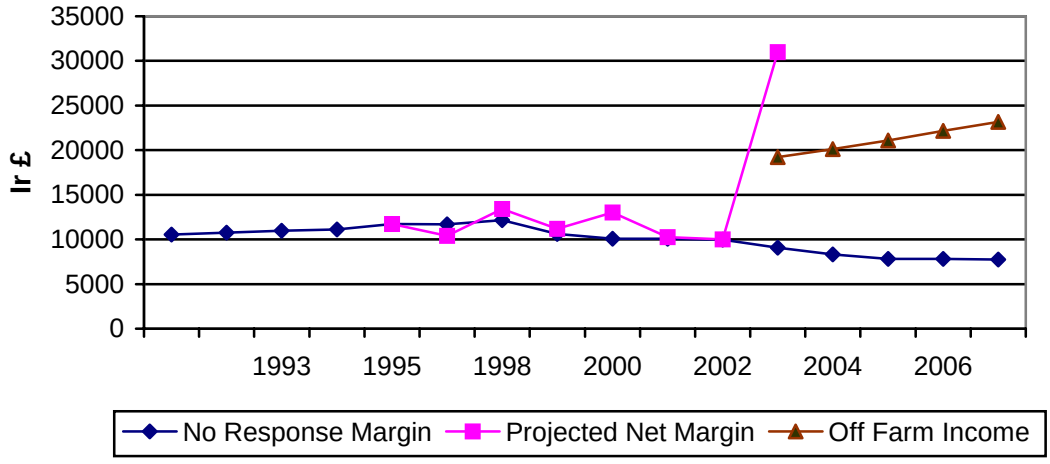
3.6.4 Static Dairy Farm

This farm has a very poor cost structure and thus farm net margin falls by approximately 40% from 1996 to 2007 if there is no farmer response.

From 1996 to 2000 the base farm plan continues to be operated, i.e. there is very little farmer response. The farm continues to supply its own 19,500 gallon quota and the 1,000 gallons leased. A two-year old steer beef system is operated. Any gain over the no response scenario in these years is due to optimisation on cattle premia collection. In 2000 this farm has the option to purchase leased quota at £1.36. It does not avail of this option and ceases leasing quota. This causes farm net margin to fall which can be seen in Figure 3-6.

In 2003, total milk quota is sold into restructuring and the dairy herd is also sold. The motivation for this can be attributed to a combination of factors. Milk price continues to fall with no sign of future recovery, costs continue to escalate and finally off farm employment is persistently more profitable. The net margin in 2003 of £32,000 reflects funds received on sale of livestock and quota. In this year, the farm also ceases dry-stock production. The farmland is let at the market rate for dairy land and labour is employed off-farm. Off-farm earnings combined with rental income are more profitable than a dry-stock system. Earnings achieved off farm are also displayed on the graph. As illustrated, off farm income in 2003 is considerably higher at £19,800 than farm net margin in 2002.

Figure 3-6: Farm Net Margin and Cash Flow Static Dairy Farm: Projected Response



Source: FAPRI-Ireland farm level model

3.7 Cattle Farm Analysis

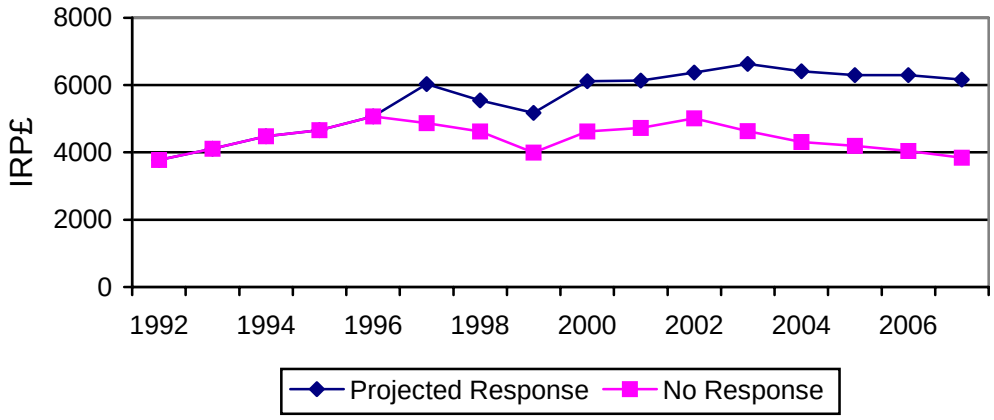
Response on cattle farms is also projected. In the case of dairy farms a great deal of the response was in reaction to new rules on quota structure. As this does not affect cattle farms the responses projected are not as dramatic. Responses described below mostly consist of changes in stocking rates, sale age of animals and stocking combinations of animals.

3.7.1 Moderate Cattle Farm

Farm net margin falls by approximately 25% in nominal terms from 1996 to 2007 if there is no farmer response.

The option of off farm employment is not a viable one for this farm because of the age profile. Fifty per cent of farmers represented by this group are over 60 years of age. Therefore it is projected that this farm will continue full-time farming.

Figure 3-7: Farm Net Margin Moderate Cattle Farm: Projected Response



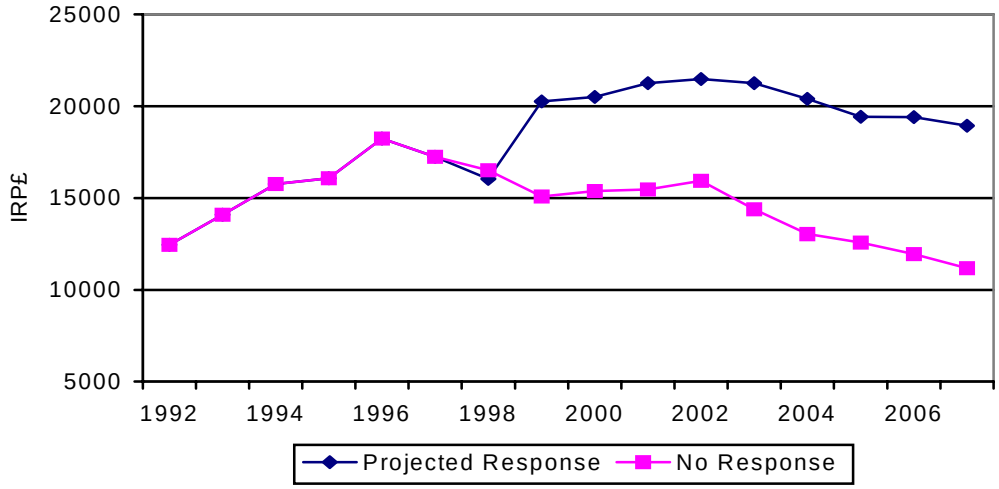
Source: FAPRI-Ireland farm level model

When the farm responds to this new situation, it is possible to maintain margins over the period. In the base year, this farm has a stocking rate of less than 1.4 livestock units per hectare. Thus, it qualifies for the higher rate of extensification in both scenarios. It is projected that from 1996 to 1999 such a farm will reduce heifer numbers to replacement requirements only. In this period, the farm continues to stock a sufficient number of suckler cows so as to claim all 11 of the available suckler cow premium rights. The remaining land is allocated to rearing stores, some of which are purchased as weanlings and sold off the farm after the first year.

Post 2000, farm net margin increases marginally to 2004 as indicated in Figure 3-7. There are two reasons for this, firstly the value of premia payable are increasing especially extensification. Secondly it is possible to claim 20% of the suckler cow premia on heifers. This enhances the margin, as heifers are more economical to stock than cows especially on an extensification farm. This means more extensification premia can be collected as heifers count as less of a livestock unit. The option of off farm employment is not a viable one for this farm as the average age of the representative farmer is 58.

3.7.2 Large Cattle Farm

Figure 3-8: Farm Net Margin Large Cattle Farm: Projected Response



Source: FAPRI-Ireland farm level model

Figure 3-8 shows farm net margin falling by approximately 40% from 1996 to 2007 if there is no farmer response.

Response boosts net margins initially and later maintains it at current levels. In the base year this farm rears heifers surplus to those required for replacement. The first step towards optimisation is to shed all excess heifers, since it is unprofitable to keep animals that do not qualify for any premia. In the base year, 15% of animals were finished on the farm. Response to new policy involves shifting to store rearing only. Stores have become relatively more profitable as the margin for finished animals is decreasing. Although the second special beef premia is not payable on a store, a large proportion of it is bid into the market price received. In addition to this, the resources on the farm can accommodate more animals in the form of stores.

Farm net margin rises considerably from 2000 onwards. There are various reasons for this. With the 90-head limit on special beef premia increased to 180, the farm extends operations. Ten hectares are rented and the store rearing enterprise is expanded. In addition to this the farm stocks three less suckler cows and the premia are collected on heifers.

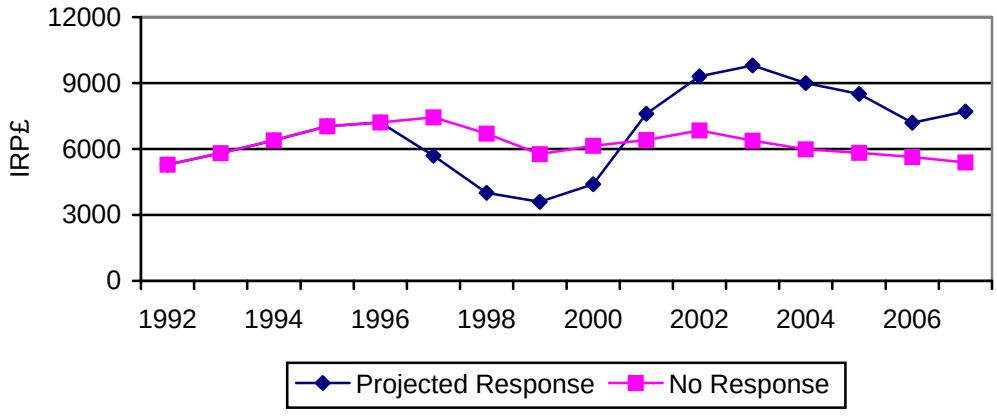
It is possible to maintain this higher margin until 2004. Following this, costs begin to increase. In addition, it is important to note that the increase in premia agreed in Agenda 2000 is fully realised by 2002, however, the price of beef continues to fall after this date. Therefore margins are higher in the early years as full compensation is being distributed before full loss is realised. The effect of this is falling farm net margin after 2004 as illustrated above.

The farm operator for this large farm is only 48 years of age. Therefore, off farm employment is a viable option. It is projected that large cattle farmers will continue to farm full-time. Through response it is possible to increase farm net margins on these farms above the average annual unskilled construction wage.

3.7.3 Efficient Cattle Farm With Off-farm Employment

Farm net margin falls by approximately 25% in nominal terms from 1996 to 2007 if there is no farmer response. Following producer response, farm net margin falls further in the initial years.

Figure 3-9: Farm Net Margin of Efficient Cattle Farm: Projected Response



Source: FAPRI-Ireland farm level model

From 1997 to 1999 labour employed on the farm is reduced. The motivation for this is the growing profitability of off farm employment in conjunction with poor cattle prices and static premia. Farm operations are downsized and 6 hectares are leased out. The suckler cow quota of 17 continues to be filled. Only heifers required for replacement are kept with the remainder being sold as weanlings. Male calves are reared for one year and sold as stores. Farm labour is reduced to half a labour unit.

The labour unit that is working off the farm can increase earnings by approximately £8000 by reducing time allocated to farm work.

As displayed in Figure 3-9, a gradual increase in farm net margin is realised from 2000 to 2003. In 2000, this farm responds to the Agenda 2000 policy changes by repossessing land leased out in earlier years. It then qualifies for the high rate of extensification. With increases in extensification, special beef and suckler cow premia the farm net margin begins to increase. Also suckler cow premia are collected on 3 heifers. The farm finishes all male steers as they collect two special beef, two extensification and a slaughter premia in their lifetime. The margins continue to rise until 2003 as the premia are increasing at a faster rate than the fall in prices. The farm can achieve this increase in margin without increasing livestock units or labour employed.

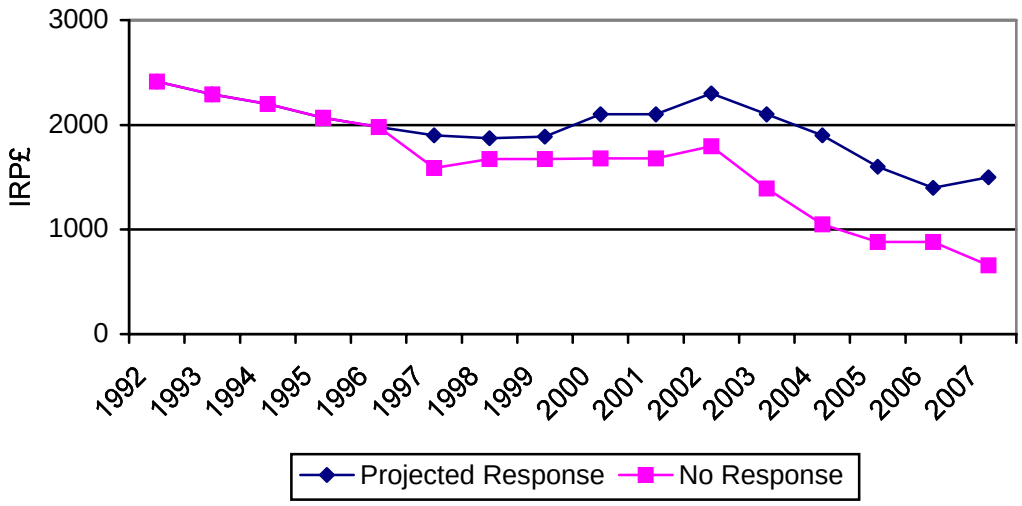
Following 2003 the farm net margin begins to fall. This is due to falling cattle prices and static premia. Margins could be maintained by opting for store beef only as it would be possible to carry more animals and therefore qualify for additional premia. However, store beef is more labour intensive. In a situation of rising off farm incomes, it is projected that this farm will not opt for a more labour intensive system. Thus, a less profitable but less labour intensive system is sustained. Although farm net margin is falling from 2004 to 2007, it is important to note that off farm income is increasing significantly in the same period. In 1997 off farm employment was increased and farm operations were scaled down. By 2007, this increase in off farm employment is valued at approximately £11,000.

3.7.4 Minimalist Cattle Farm

The consequences are severe if this farm does not respond to the new economic environment and agricultural policy. Cost structure on this farm is poor, as the fixed costs per unit of output are very high. In 1996 70% of the farm gross margin was consumed by fixed costs. These costs are projected to increase considerably over the projection period. If the farm does not respond then by 2007 farm net margin will have fallen by 70% in nominal terms on its 1996 levels.

In an economically optimal situation, this farm would let all land and work completely off the farm. As the average age of a minimalist farmer is 50 it is plausible that off farm employment could be increased further. However, it is noted from historical data that this farm did not make this optimal adjustment previously and therefore it is projected that it will not in the future. It is assumed that reasons exist, other than economic rationale, for this farm to remain in business. It is also assumed that if this farm remains in farming its objective will be to maximise its income per hectare while minimising costs and, particularly, labour input.

Figure 3-10: Farm Net Margin of Minimalist Cattle Farm: Projected Response



Source: FAPRI-Ireland farm level model

By responding to the new situation, it is possible to recoup some of the loss associated with a no response scenario, albeit the response by this farm is minimal. It is not possible however, to maintain net margins at 1996 levels, as shown in Figure 3-10. This is, again due, to the crippling effect of high overhead/fixed costs. In the base year this farm qualifies for the higher rate of extensification. The increase in extensification payments in 2000 and thereafter contribute to the rising farm net margin in both a response and no response scenario. In the response scenario it is possible to boost farm net margin further by adjusting stock. In the base year this farm finished heifers at 21 months. However, it is likely to sell off all heifers as weanlings and substitute them with extensification eligible animals. The system operated on this farm is similar to the previous part-time farm. Due to its cost structure and labour availability, it opts for a calf to beef system.

3.8 Conclusions and Summary

This paper presents projections for eight representative farms. The first set of projections is in relation to changing farm structure. If historical trends are to continue then structure of both cattle and dairy farms will change. The number of "average" dairy farms will diminish. Due to changing economic situations dairy farms can no longer remain "average". It is projected that there will be a large increase in the number of developing dairy farms and also in the number of static dairy farms. In other words, in coming years dairy farmers face a decision to follow an aggressive development plan and acquire quota. Or alternatively begin to scale down operations with a view to exiting from dairy production. In relation to cattle farms, it is projected that recent increases in the number of part-time cattle farmers will continue. It is projected that by 2004, 66% of all cattle farmers will have an off farm job.

The paper also presents projections of farm net margins under two scenarios. Firstly farm net margin is projected where there is no farmer response, i.e. current farming practises are continued. Secondly farmer response to new policies and economic situations are also projected.

If there is no farmer response and current farming practises are continued, the effects on farm margins are drastic. Projections show that all farms regardless of size or system, will be subjected to a price-cost squeeze. Value of output remains constant over the period analysed. However, fixed costs increase by 15 to 20% thus impacting negatively on farm net margin. Large and part-time farms are worst affected. This is because these farm types tend to have high overhead costs per unit of output.

It is projected that it will be possible to maintain or increase margins in most cases by responding to the new policy package. For dairy farms this response is mostly in the form of expansion. It is projected that farms will avail of the option to purchase currently leased quota and will seek additional quota. If priority groups are designated for allocation of quota, it is likely that smaller farms in general will be able to acquire as much quota as it is profitable to purchase. Through modest expansion of quota, it is possible for smaller farms to achieve increases in margin. Projections differ for dairy farms that currently have a small quota, 20,000 gallons or less. Farms with a small base and poor cost structure especially fixed costs are projected to experience tight margins. Where facilities and technical efficiency is poor it is projected that such farms can not profitably expand quota. Without expansion of quota margins are projected to become even tighter. By 2003, it is projected that such farms will sell quota into restructuring and exploit the economic attractiveness of off farm employment.

Take-up of extensification on cattle farms is projected to be substantial. Extensification farms are likely to shed all non premia eligible animals, i.e. two year olds, heifers etc. All farms are projected to avail of new suckler cow premia rules in relation to claiming on heifers. Through a combination of these factors it is projected that farm net margin on cattle farms can be maintained and increased in most cases. Off farm employment will continue to be a major issue for cattle farmers to consider. It is projected that current part-time farms will reduce livestock numbers to extensification criteria and increase time spent working off farm. It is projected however, that margins can be maintained at a sufficiently high level on large cattle farms so that farming remains more attractive than off farm employment.

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4 Agribusiness and economy-wide effects of the Agenda 2000 CAP EU reform

Alan Matthews and Ronnie O'Toole
Trinity College Dublin

Introduction

The FAPRI-Ireland agricultural sector model is used to make projections of agricultural output, input use and incomes as well as to investigate the impact of alternative policy scenarios on these variables. The effects of these changes on the processing sector and on the general economy are not fully captured in a sectoral model. The project on which this paper is based set out to develop a methodology which would allow the economy-wide effects of agricultural sector developments to be estimated.[1] This paper briefly describes this methodology and applies it to examine the economy-wide impact of the Agenda 2000 reforms as projected by the FAPRI-Ireland team in May 1999 (Donnellan et al., 1999).

The changes in the levels of agricultural output, input purchases and farm income arising from the Agenda 2000 reform will give rise to consequential knock-on effects for other sectors of the Irish economy in a number of ways. First, agriculture is linked to the rest of the economy through a series of ***backward linkages***. Changes in farmer purchases of inputs such as fertilisers, animal feeds, veterinary supplies and other materials and services will impact on activity levels in the corresponding input supply industries, also with consequential employment and income effects. The FAPRI-Ireland model calculates the direct or first-round impact on the input supply sectors but there will be further impacts as the changes in these sectors ripple through the rest of the economy. Second, agriculture is linked to the rest of the economy through a series of ***forward linkages***. Changes in the supply of agricultural raw materials will induce changes in activity levels in the corresponding processing industries (meat, milk, grain milling, sugar refining, fruit and vegetable processing) with potentially significant employment and income effects. Third, the changes in farm income arising from the combination of output, price and direct payments changes will result in changes in the level of ***farm household expenditure*** on other goods and services which will have further effects on activity levels in the industries producing these goods and services. Potentially, these knock-on or multiplier effects may be as large as the primary income and employment effects in the agricultural sector itself.

This paper presents a methodology to quantify both the size of these multiplier effects and their distribution across sectors in the rest of the economy. The approach uses a 1993 input-output table of the Irish economy with a significant disaggregation of the agro-food complex to capture these linkage effects. Input-output analysis is a standard approach to measuring the interdependencies inherent in an economy. Its use in scenario modelling has been criticised because of the restrictiveness of the assumptions which lie behind the input-output model. We show in this paper how these assumptions can be partially relaxed in order to realistically capture not only changes in the levels of agricultural output but also changes in prices and technology (input coefficient structures) at least in the agricultural sector.

Section 4.1 of the paper briefly describes the construction of the 1993 input-output table. Section 4.2 reviews some basic concepts in input-output analysis, highlighting in particular the distinction between final demand and gross output in each sector and the implications of endogenising the household sector. Section 4.3 discusses the methodology used to calculate the economy-wide effects of the agricultural output and input changes projected by the FAPRI-Ireland model. Section 4.4 describes the changes in the agricultural sector projected to arise from the Agenda 2000 reform and how these changes are applied to the input-output model. Section 4.5 presents the results. Section 4.6 concludes the paper and discusses the implications of the results.

[1] This paper draws on the results of a collaborative project between UCD and TCD which was supported by the Food Research Stimulus Fund as part of the FAPRI-Ireland project. Deirdre O'Connor was the UCD partner in the project. Financial assistance from the Stimulus Fund is gratefully acknowledged. We would also like to acknowledge the advice and assistance received from Eamon Henry and Andy Conway in the preparation of the 1993 input-output table used in the paper.

4.1 The 1993 input-output table

An input-output table is a unified set of production accounts which, for the base year, gives the flows between all of the various production activities. The most IO recent table for the Irish economy produced by the Central Statistics Office is the 1993 table (CSO 1999). This aggregates agriculture, forestry and fishing (AFF) into a single sector, reducing the possibility of a meaningful analysis of any one agricultural commodity or industry. The table used in this paper has disaggregated the AFF sector into ten agricultural sub-sectors comprising four livestock sectors, four crop sectors and separate sectors for forestry and fishing. Within the food processing sector, the standard CSO table distinguishes meat and meat products, milk and dairy products and other food processing. In the current table, the Other Food Products sector has been further disaggregated to separately identify the Farm Animal Feed Sector, while beverages and tobacco have been combined into a single sector. In addition, the 37 other sectors distinguished in the standard CSO table have been aggregated to 21 sectors. The IO table used for this paper thus consists of 33 sectors which are shown in Table 4.1.

Domestic production flows are valued at basic prices and imports are valued at c.i.f. prices. Basic prices mean that net taxes on products (taxes on products less production subsidies) are not included in the value of transactions between industries but are treated in a separate row of the IO table. Transportation costs and retail margins which buyers incur in addition to the basic prices are included in the rows for the branches providing these services.

The IO technical coefficients used for the 8 agricultural sectors are based on those originally derived from Teagasc National Farm Survey data for 1990 (see O Cinneide, 1997) updated to be consistent with CSO total input purchase values in 1993. The fact that these coefficients pre-date the MacSharry CAP reform and the more widespread introduction of direct payments is something for which allowance must be made when evaluating the Agenda 2000 change.

Table 4.1. Sector classification in the 1993 IO table

Milk (1)	Milk Prods.(17)
Cattle (2)	Farm Anim.Feed(18)
Sheep+Wool(3)	Other Food nes(19)
Pigs,Poul.Hors(4)	Beverag.+Tobac(20)
Wheat,Bar.Oats(5)	Textil.Cloth.Lea.(21)
Fruit + Vegetab.(6)	Wood+Paper(22)
Root+Green (7)	Rubb.Plast.,O.M(23)
Other Crops (8)	Construction(24)
Forestry (9)	Trade Marg.+Rep(25)
Fishing (10)	Lodging+Cater.(26)
Petrol.+Coal (11)	Inland Transpt.(27)
Elec.,Gas,Wat.(12)	Mar.,Air,Aux.Tr.(28)
Non-Met.Min.(13)	Communications(29)
Chemicals(14)	Credit+Insur.(30)
Metal,Eng.,Veh.(15)	Other Mkt.Serv.(31)
Meat(16)	Gener.Publ.Serv.(32)
	Other Non-Mkt.S(33)

4.2 Multipliers in the input-output model

A schematic IO table is shown in Table 4.2 which can be used to make some basic points about input-output modelling. The table distinguishes between inter-industry flows, final demand (including household consumption, investment and exports) and gross output in each sector. Gross output is the sum of inter-industry requirements and final demand.

Suppose now that this economy experiences an increase in export demand of one unit of milk. By making the assumption that each unit of output uses inputs in the fixed proportions given in the table, we turn the input output table into an input output model. We can then solve this model for the necessary increase in milk output to provide the one additional unit of milk exports. The table indicates that a certain amount of milk is required as an input in the production of milk itself. Milk production also requires a certain amount of other inputs, some of which in turn may require milk as

an input. Thus, in order to supply one additional unit of milk exports, the gross output of milk must increase by more than one unit. Solving the input output model allows us to calculate the ***milk output multiplier*** for milk, or the relationship between the initial stimulus to final demand and the ultimate increase in milk output.

Alternatively, the model can be solved in reverse. Given a target level of milk output, it is possible to solve the input output model for the amount of milk final demand which will exactly absorb this milk output. This is the approach used to link the IO model with the FAPRI-Ireland simulation output. Note that the level of final demand will always be smaller than the level of gross output where there are inter-industry transactions to be taken into account.

The input output model can be used to derive ***household income*** and ***employment*** multipliers for individual industries. These are interpreted as the total direct and indirect effects on income and employment of a one unit change in ***final demand*** for a particular industry. This is because they take into account not only the income and employment effects in that industry itself, but also the income and employment effects in industries which provide inputs into that industry.

Table 4.2. Schematic 3x3 sector input-output table

	Milk	Feed	Other	Final demand	Gross output
Milk	2	0	2	10	14
Feed	3	3	3	6	15
Other	3	3	6	5	17
Labour	6	9	6	0	21

It is possible to broaden the scope of the input output table to include the household sector as part of the inter-industry matrix. This means that the level of household consumption is no longer treated as a fixed component of final demand, but is assumed to respond in fixed proportions to changes in household income. Table 4.3 shows the effect of this assumption on our schematic input-output table. In this instance, a change of one unit in the export demand for milk will have an even larger effect on the economy because it will induce a change in household income and expenditure which, in turn, will require higher activity levels in each industry to meet. The multipliers derived on this assumption are interpreted as showing the total direct, indirect and induced effects on output, income and employment, respectively, of a one unit change in the final demand for a particular industry. We make the assumption that household consumption is endogenous in the modelling scenarios reported later in this paper.

Table 4. 3. Schematic 4x4 sector input-output table

	Milk	Feed	Other	Household consumption	Other final demand	Gross output
Milk	2	0	2	4	6	14
Feed	3	3	3	3	3	15
Other	3	3	6	3	2	17
Labour	6	9	6	0	0	21

Two important methodological assumptions need to be highlighted at this stage. First, the FAPRI-Ireland agricultural sector model estimates the impact of the Agenda 2000 reforms in the years when the reforms are implemented. For beef and cereals, these reforms are phased in starting in 2000; for dairying, the reforms are postponed to 2005. The May 1999 FAPRI-Ireland projections ran out to 2007 and it makes sense to look at the impact in that year as embodying the full impact of the Agenda 2000 reforms.

Unfortunately, we not have an input-output table showing the structure of the economy in 2007. The input-output table we do have is for 1993. There are two ways of trying to bridge this gap. One approach would be to 'blow up' the 1993 economy to 2007, making certain assumptions about the growth rate of production and structural change in the composition of the economy in order to construct an input-output table of the economy in that year. The alternative approach, and the one

used in this paper, is to take the Agenda 2000 reforms and to apply them to the 1993 structure of the economy. Thus the question being asked in this paper is the following:

- **what difference would it have made to the Irish economy in 1993 if the Agenda 2000 reforms, in terms of price cuts and increases in direct payments, had been implemented in that year, holding levels of final demand in all non-agricultural sectors constant?**

One implication of this assumption is that it is necessary to translate the actual change projected in 2007 as a result of the Agenda 2000 reform into a comparable change in 1993. The way this is done is described later in the paper.

The second methodological assumption concerns the status of the FAPRI-Ireland figures. We saw above that an input output table distinguishes between final demand, representing the initial stimulus to the economy, and the resulting levels of gross output consistent with those levels of final demand, which represent the activity levels in each industry necessary to ensure the delivery of final demand. We can pose the following question:

- **Suppose a FAPRI-Ireland simulation run suggests a 5 per cent increase in the volume of milk production. Should this figure be treated as an increase in the final demand for milk or as an increase in the gross output of milk in the IO context?**

Treating the milk increase as an increase in final demand is equivalent to seeing it as a direct effect. In order to capture the indirect and induced effects as well, it would be necessary to solve for the appropriate level of milk gross output. Assuming some inter-industry demand for milk either as an input into production or as part of household consumption will inevitably lead to an increase in milk output greater than 5 per cent, thus contradicting the initial FAPRI-Ireland projection. The more logical perspective is to assume that the FAPRI-Ireland figure for the change in milk output is equivalent to the change in the gross output of milk in the IO table. Then, in order to apply the multiplier analysis, it is necessary to solve for the required change in final demand consistent with this increase in milk output. This approach assumes that the econometric equations explaining output contained in the FAPRI-Ireland model implicitly take into account the indirect and induced effects necessary to produce those outputs when they are estimated using aggregate data. Thus, we solve the IO model to ensure that the implied changes in gross output are consistent with the FAPRI-Ireland output figures. We do not simply assume that these changes are only the direct effects and equivalent to changes in final demand.

4.3 Capturing backward, forward and household expenditure linkages in the IO model

Adopting the perspective that the FAPRI-Ireland model projections represent total output levels in the final equilibrium of the economy when all the direct, indirect and induced effects have worked themselves through, we want to solve the IO model for the level of final demands for the primary agricultural products consistent with these output levels. To obtain the change in output, incomes and employment in the rest of the economy, the IO multipliers are applied to these changes in final demand. However, this step only captures a part of the economy-wide effect of changes in the FAPRI-Ireland model.

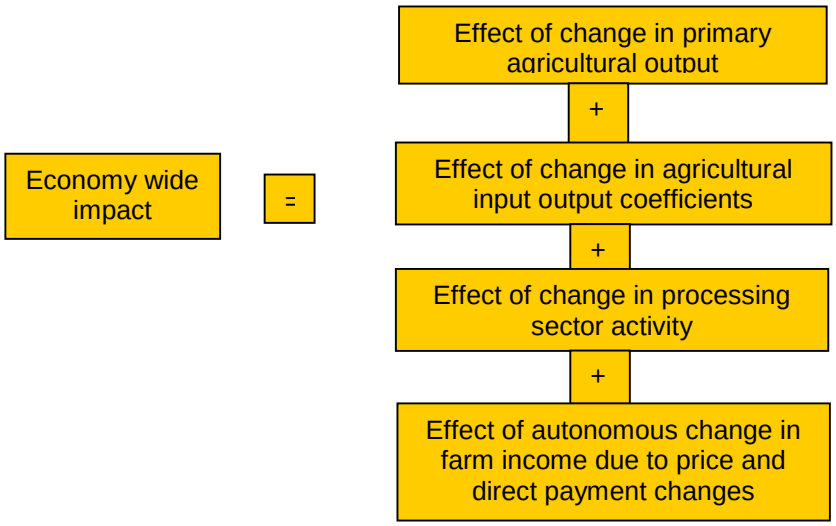
FAPRI-Ireland projections and simulations provide information on the expected changes in agricultural output, input purchases, net subsidies and farm incomes over the projection period. These changes impact on the wider economy through five channels which are separately modelled in the IO model. These five channels are:

- the effects of volume changes in primary agricultural output. This is the step which has been described so far;
- the effect of changes in the amount of inputs required to produce the new volume of output due to input substitution because of changed relative prices or because of technical change;
- the effect on the processing sector of the volume changes in primary agricultural output;
- the effect of price changes of both outputs and inputs; and
- the effect of changes in net subsidies arising from changes in direct payments.

Schematically, the modelling procedure is outlined in Figure 4.1. First, the direct, indirect and induced effects of changing gross output of primary agricultural commodities in line with the changes in the FAPRI-Ireland scenario are calculated. At this stage, we focus particularly on the changes in input use projected by the IO model. Because the IO model assumes fixed coefficients, it is very unlikely that the input use changes projected by the IO model will be similar to those projected by the FAPRI-Ireland model which is flexible enough to allow for input substitution and technical change. Thus, a second stage in the methodology is to trace through the direct, indirect and induced effects of the difference between the input use projected by the two models.

An example might help to make this clearer. For example, suppose that in the base 1993 model £300m fertiliser expenditure is associated with gross agricultural output (aggregating over the eight agricultural sub-sectors) of £3 billion, giving a fertiliser input coefficient of 0.1. Suppose now that the simulation projects a 10 per cent decrease in the volume of gross agricultural output, implying that the volume of fertiliser use should also decrease by 10 per cent. Note that it is the inter-industry *use* of fertiliser which declines by this amount, not necessarily total output if, for example, there are fertiliser exports or other sales to final demand. However, suppose that the FAPRI-Ireland simulation projects total fertiliser use will decline by only 5 per cent. Therefore, application of the standard multipliers would over-estimate the economy-wide effects of the fall in agricultural output. The second step essentially corrects for this by adding back the economy-wide effect of an increase in fertiliser output equivalent to the difference between estimated fertiliser use using the IO model fixed coefficients and the projected fertiliser use from the FAPRI-Ireland model.

Figure 4.1. Steps involved in calculating the economy-wide impact



Step 1 of the procedure calculates the change in final demand for the eight primary agricultural commodities in the IO model. In Step 3 of the procedure, we take into account the additional economy-wide impacts of processing this additional final demand. Here we distinguish between meat and milk, on the one hand, where we assume that all increases in final demand would be processed, and other primary agricultural commodities where we assume none will be processed. This arbitrary assumption reflects the constraints of fixed coefficients in the IO table. A commodity like wheat, for example, which may be a very small input component in some industries, would require a very large increase in the output of those sectors in order to absorb all of the change in wheat final demand into inter-industry demand. We therefore make this assumption to avoid unreasonable increases in the output of Other Food Industries.

The final step, Step 4, is to take account of the autonomous change in farm household income which arises both because of changes in the prices of agricultural outputs and inputs and because of changes in direct payments. The volume effects of changes in relative prices are already accounted for in the earlier steps, so the only remaining impact is to alter the level of farm income, conditional on the output levels and input volumes used.

Each of the steps shown in Figure 4.1 are conceptually separate and can be added together to arrive at the economy-wide impact of changes in the agricultural sector. In particular, note that the first three steps are concerned with changes in the ***volume*** of activity in primary agriculture and the input supply and processing industries, while Step 4 is concerned with the impact of an autonomous ***change in farm household income***. However, it is important to ensure that, jointly, they result in just the level of gross output and input use projected by the FAPRI-Ireland model. This consistency check is ensured through the calculation procedures adopted in the model.

Thus, the steps in the solution of the IO model are slightly different to the schematic steps outlined in Figure 4.1. Briefly, the calculation of the economy-wide effects takes place in four stages:

- in the first stage, the direct, indirect and induced effects of the re-spending of the autonomous change in farm income due to changes in prices and direct payments are calculated. The total income and employment effects are put to one side to be added to the total income and employment effects of the volume changes in farm outputs and inputs calculated in the third stage. We also take note of the changes in household demand for the eight primary agricultural commodities in the IO model. Because these are absorbed directly by households, they are not available for processing in stage three.
- In the second stage, the direct, indirect and induced effects of the change in gross output of the eight primary agricultural commodities are calculated. In this stage, we are only interested in the output levels for the input industries supplying the agricultural sector. Any change in these output levels reflects the fixed coefficients assumption behind the IO model. The change in output levels for the input supply industries is compared with the output changes for these inputs projected in the FAPRI-Ireland model. Any difference between the two sets of figures represents a change in input use due to input substitution or technical change, and is included independently in the final calculation stage.
- The third calculation stage, takes into account all of the volume changes in primary agricultural output and the input supply and processing industries. First, the amounts of primary agricultural output absorbed directly in household consumption are subtracted from the output changes derived from the FAPRI-Ireland model to give a set of ***revised output*** figures. The input output model is then solved simultaneously for:
    - the levels of gross output in the milk and meat processing industries sufficient to fully absorb the change in the revised output for milk and meat at farm level, on the assumption that 100 per cent of any change in the output of these sectors is processed. Thus, final demand for milk and meat products at farm level is held constant.[2]
    - the levels of final demand for the remaining three primary agricultural products consistent with the revised gross output figures for these industries;
    - the change in final demand in the input supply industries representing the change in input use due to input substitution or technical change calculated in the previous stage.
- The fourth, and final, calculation stage simply sums the economy-wide impacts on output, GNP, household income and employment from the first stage (due to autonomous changes in farm household income) and the third stage (due to volume changes in the levels of farm output, processing and input use) in order to obtain the total economy-wide effects.

4.4 Modelling the Agenda 2000 shock

The May 1999 projections of the FAPRI-Ireland model are used in order to derive the impact of the Agenda 2000 CAP reform on the agricultural sector. This impact was measured in the May 1999 paper as the difference in agricultural commodity output, input use and farm income over a ten-year projection period between a baseline projection and a projection incorporating the Agenda 2000 reforms.[3] The measured impact of these reforms is shown in Table 4.4. This impact represents the first-round impact of EU policy reforms on the agricultural sector measured at the end of the projection period of ten years.

[2] Because the changes in final demand levels in the three meat products beef, sheepmeat and pig and poultrymeat will not be the same except by extreme coincidence, it is necessary to divide the meat processing activity into three separate activities in order to absorb these changes. Thus, the calculations in the third stage are done using a 36x36 matrix in which meat processing is disaggregated into beef processing, sheepmeat processing and pig and poultrymeat processing.

[3] It is important to note that the baseline presented in the May 1999 FAPRI-Ireland paper and that presented to the Conference today are different, although they cover the same projection period. In the Conference presentation today, the Agenda 2000 reforms are now incorporated into the baseline as they have been adopted by the Council of Ministers. The baseline in the May 1999 paper assumed the continuation of the MacSharry CAP policies as Agenda 2000 had not yet been adopted.

Table 4.4 Effect of Agenda 2000 reform on Irish agriculture in 2007

	Baseline	Agenda 2000	Difference	
	£m	£m	£m	%
Gross agricultural output	3,223.2	2,945.8	-277.4	-8.6%
Inputs	1,762.0	1,741.8	-20.2	-1.1%
Gross agricultural product at market prices	1,461.2	1,204.0	-257.2	-17.6%
Net subsidies	886.6	1,274.3	387.7	43.7%
Gross agricultural product at factor cost	2,347.7	2,478.3	130.5	5.6%
Depreciation	453.2	435.0	-18.1	-4.0%
Income arising in agriculture	1,676.8	1,832.0	155.2	9.3%

Source: Donnellan, T., Binfield, J. and McQuinn, K. (1999).

In order to interface the FAPRI-Ireland model with the IO model, the results of the Agenda 2000 shock as reported in the May 1999 paper must be converted into an appropriate format. Four steps are involved:

- Choosing a ***reference year*** in which to measure the impact of the Agenda 2000 reform. In this simulation we choose 2007 as the reference year.
- Identifying the percentage changes in ***output and input volumes*** resulting from the Agenda 2000 reform and transforming these into equivalent shocks to the 1993 IO table.
- Identifying the percentage changes in ***output and input prices*** resulting from the Agenda 2000 reform and calculating the equivalent shock to farm income in 1993 (in 1993 money values).[4]
- Translating the impact of the ***change in direct payments*** in the Agenda 2000 package into 1993 terms. This is done by calculating the change in individual payments as a result of the Agenda 2000 reform, deflating these changes to 1993 values, and multiplying the change in individual payments by the numbers of eligible animals or hectares, respectively, in 1993.

Table 4.5. Agenda 2000 impacts applied to the IO model

	Volume shock		Income effect of price changes	Income effect of net subsidy changes
	% change	£m	£m	£m
Milk	2.2%	25.4	-88.8	67.2
Cattle	-1.0%	-13.2	-104.4	188.6
Sheep + Wool	-2.4%	-4.2	0.0	2.9
Pigs,Poultry,Horses	1.3%	5.0	-9.1	
Wheat,Barley, Oats	1.5%	1.9	-6.6	4.6
Root + Green Crops	0.0%	0.0	0.0	
Fruit+ Vegetables	0.0%	0.0	0.0	
Other Crops	0.0%	0.0	0.0	
Inputs	-0.1%	-1.5		
Total change		13.3	-208.9	263.2

The resulting changes are shown in Table 4.5. We can observe that both the overall volume and farm household income effects are positive but neither are quantitatively very significant. Thus, it will not be surprising to find that the economy-wide effects of these changes are also rather small. However, what is of interest to focus on is the relationship between the direct effects of these changes, as

[4] The changes in prices appropriate to the 1993 table are not the same as those implemented in 2007 because the 1993 table does not take into account the MacSharry reforms. The essence of the Agenda 2000 reform was to maintain a relationship between the loss of income due to price reductions and the size of compensation provided through direct payments. The appropriate 1993 price reductions are derived by taking the absolute value of the loss due to the price reduction under Agenda 2000 (evaluated at 1993 prices) and working out what implicit price reduction in 1993 would have given rise to this loss. Because product prices for cattle and cereals were relatively much higher in 1993 than after 2000 when the Agenda 2000 reforms take effect, applying the actual Agenda 2000 price reductions would result in proportionately greater losses in 1993 which would not be compensated by the increase in direct payments actually paid. This would give rise to a misleading account of the effect of implementing the Agenda 2000 reform.

measured in the farm sector alone, and the total economy-wide effects once they have worked through the rest of the economy.

4.5 Economy-wide effects: Results

The processing sector impact of the changes in commodity output in the milk and meat sectors is shown in Table 4.6. Recall that the assumption behind these figures is that all changes in farm-level output of milk and the three meat products not directly absorbed either into household consumption or inter-industry use will be reflected in changes in processing activity. No account is taken of changes in processing activity arising from the impact of changes in other primary agricultural production. The small change the output of the Other Food Industries arises mainly because of the indirect effect of changes in activity levels in industries which use output from the Other Food Industries as an input, as well as the induced effect of the changes in household expenditure. Any impact due to a change in the scale of processing would need to be added to this effect.

Table 4.6. Impact on the processing sector

£ million	FAPRI-Ireland model change in primary agricultural outputs	IO model change in processing activity
	£m	£m
Milk	25.4	50.6
Beef	-13.2	-23.1
Sheepmeat	-4.2	-7.1
Pig and poultrymeat	5.0	7.5
Meat processing	-12.4	-22.7
Other food industries	1.9	2.0
Total	14.9	29.9

The household income impacts are shown in Table 4.7. The total change in farm household income arising from the changes in the volume of production, price changes and changes in direct payments would have amounted to £57.6m in 1993 (of which £54.3m represents the combined effect of the price and direct payment changes alone). There would be a further increase of £1.5m in the income arising in the food processing sector as a result of the greater level of processing activity, plus an increase of £15.6m in income arising in the non-agrifood sectors. The total impact on household income in the economy would amount to £74.7m compared to the direct farm income impact of £57.6m, or 30 per cent more.

Table 4.7. Household income impacts of the Agenda 2000 reform

Household income £m	Actual change	Percentage change
Farm income	57.6	+3.3%
Food processing income	1.5	+0.3%
Farm and food processing	59.1	+2.7%
Other sectors	15.6	+0.1%
All sectors	74.7	+0.5%

Household income is just one component of the value added or GNP effect which is shown in Table 4.8. Gross agricultural product in agriculture in 1993 would have increased by £64.2m if the Agenda 2000 reform had been implemented in that year. However, the overall impact on the Irish economy would have led to a GNP increase of £98.1m, or an increase 53 per cent greater.

Table 4.8. GNP impact of the Agenda 2000 reform

GNP £m	Actual change	Percentage change
GNP agriculture	64.2	+3.5%
GNP food processing	2.6	+0.3%
GNP farm and food processing	76.8	+2.5%
GNP other sectors	31.3	+0.1%
GNP all sectors	98.1	+0.4%

Finally, Table 4.9 shows the employment impacts of the Agenda 2000 reform. These employment effects are calculated on the basis of 1993 average productivity levels in each sector. They indicate how employment levels in 1993 might have been different with the implementation of the Agenda 2000 package in that year; actual employment changes in 2007 will differ to the extent that labour productivity increases in the intervening period. In addition, the agricultural labour is based on estimated 'labour required' rather than 'labour available' on farms to take account of the existing under-employment of farm labour.

The results show that there would be a net decline in employment in the farm sector, despite the slight increase in the overall volume of farm output. This is due to the composition of the output effects, where the increase in output takes place in dairying (which has a relatively low labour input per unit of output) while decreases take place in the cattle and sheep sectors (where labour input per unit of output is relatively higher). However, these negative on-farm employment effects would be offset by significant employment increases in the food processing sector (plus 70 persons) and, particularly, in the non-agri-food sector of the economy (plus 1,350 persons). This high off-farm employment multiplier is perhaps the most significant finding to emerge from the paper. It arises, in small part, because of employment increases in the processing sector which are not directly captured in the FAPRI-Ireland model, but much more importantly, because of the effect of the respending of the additional farm household income in the non-agrifood sectors of the economy.

Table 4.9. Employment impacts of the Agenda 2000 reform

Employment (nos)	Actual change	Percentage change
Farm labour required	-120	-0.1%
Food processing	70	0.2%
Farm and food processing	-50	0.0%
Other sectors	1,350	0.1%
All sectors	1,300	0.1%

4.6 Conclusion

This paper has outlined a methodology to link the output from FAPRI-Ireland projections and policy simulations to an input output model of the Irish economy in order to calculate the economy-wide implications of changes in the agricultural sector. This methodology is then applied to estimate the economy-wide implications of the Agenda 2000 reforms agreed by the EU Council of Ministers in May 1999.

Because the input-output table relates to 1993, the question posed is how different the Irish economy would have looked in 1993 if the Agenda 2000 reforms had been implemented in that year, holding final demand for all non-agrifood sectors in the economy constant. The results suggest that the off-farm impacts of changes in the agricultural sector are important. Processing sector output changes by more than twice the change in the output of primary agriculture. Economy-wide household income and GNP impacts are approximately 30 per cent and 50 per cent greater, respectively, that the changes in the farm sector alone. But the particularly significant change concerns the knock-on employment effects in the rest of the economy. Here a negative on-farm employment change as a result of the Agenda 2000 reform is converted into a significant positive employment change for the economy as a whole.

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5 Future Developments in Policies and Markets

Julian Binfield, Trevor Donnellan, Kieran McQuinn and B. Riordan
Rural Economy Research Centre
Teagasc

Introduction

Commodity market analysis, such as that currently conducted within the FAPRI modelling system, relies on certain assumptions, which underpin the results attained. The FAPRI models[1] are "partial equilibrium" models in that they do not attempt to trace the effects of changes within the agricultural sector on the overall macro economy. This means that certain key variables are taken as determined outside the overall commodity analysis.

These external, or "exogenous", variables may have a significant effect on the projections for the commodities in question but the commodity results do not in any way affect the path of the macro variables. One of the most important assumptions is the choice of the different exchange rates, which are likely to exist between the different currency blocs.

The other assumption that is fundamental to the concept of a baseline is that there is no change in current policy. However, it is obvious that important policy developments will occur over the next ten years. These developments include a further round of WTO talks, the review of the current Common Market Organisation (CMO) for the main commodities due to take place during the period of the Agenda 2000 Agreement, and the prospect of EU enlargement. Further reform of the CAP cannot therefore be ruled out.

The first part of this paper presents the results of the simulation of the models under different exchange rate assumptions. This provides an indication of the sensitivity of the projections to varying assumptions about exchange rates. The second part of the paper discusses future policy developments. In particular the potential impact of WTO negotiations, the Kyoto Protocol and EU enlargement. The implications for the future work programme of the FAPRI-Ireland Partnership are then drawn out.

5.1 Exchange Rate Simulations

The two major reforms[2] of the Common Agricultural Policy (CAP) in the last decade have had the specific aim of bringing EU commodity prices closer to the corresponding world commodity prices. The aim of the EU Commission in particular is to bring the EU to a position where its commodities can compete with produce on the world market, without recourse to export subsidies. This means that the exchange rate between the euro and the dollar will assume far greater importance in years to come as EU prices move closer to those which prevail on external world markets. Thus the choice of an exchange rate path between the euro and the dollar can have substantial implications for the prices projected for many different agricultural commodities and in turn the production response of the different countries within the major trading blocs.

The FAPRI-Ireland model is an extension of the overall FAPRI world system. The Irish model relies on EU prices for the different agricultural commodities, which are generated based on interaction between the FAPRI EU GOLD model and the overall FAPRI world system. Being part of this large system requires that the same macroeconomic assumptions which underpin the FAPRI world and EU analysis must also underpin the Irish analysis. FAPRI utilise leading macroeconomic agencies as their sources for these key macroeconomic assumptions (Wharton Econometrics Forecasting Associates (WEFA), Data Resources Incorporated (DRI) and Project Link (United Nations)). The international macroeconomic projections made by these groups have also underpinned the results from the FAPRI-Ireland model published to date. The

[1] FAPRI models here is taken to mean both the world system created and maintained at Columbia, Missouri and Iowa State and the FAPRI-Ireland Partnership's model created and maintained at Teagasc.
[2] McSharry (1992) and the Agenda 2000 (1999).

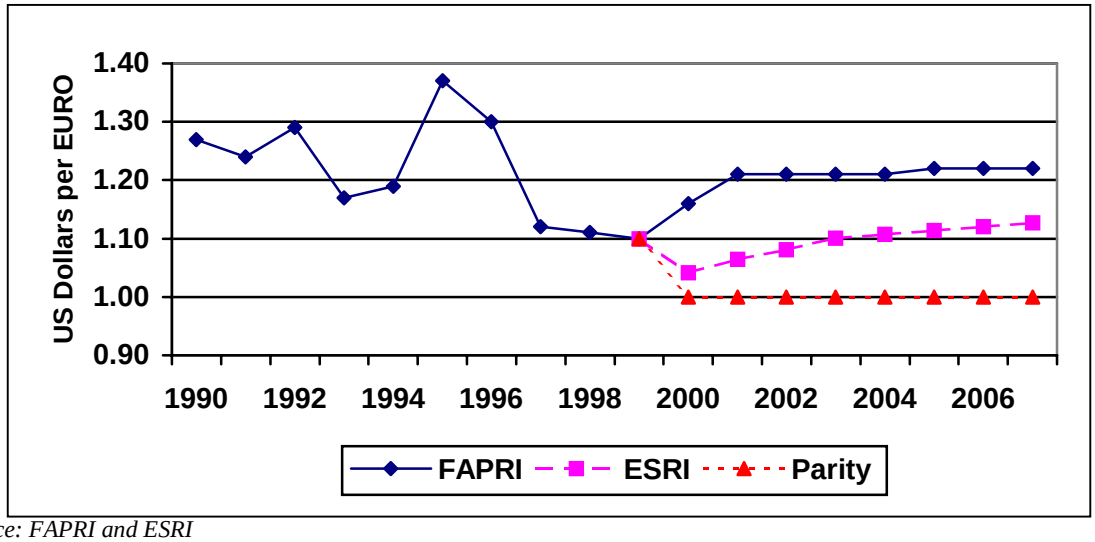
FAPRI-Ireland model also uses macroeconomic variables forecast by the ESRI, which are specific to the Irish economy.[3]

Because of the growing importance of the exchange rate in EU commodity analysis the FAPRI-Ireland team decided to accompany the annual output of the baseline result with results from different exchange rate scenarios. In doing this, the following issues are thereby addressed:

- The future path of the dollar/euro rate has attracted considerable attention. In general most would agree that the euro to date has not performed as most experts had envisaged. By providing the results of additional exchange rate scenarios additional information is available to the policy maker.
- The sensitivity of the agricultural sector, and in turn the projections, to the volatility of exchange rate movements is identified and quantified.
- By quantifying the implications for the international trade in EU commodities one can establish a context for the potential implications of future policy changes such as WTO agreements or enlargement of the EU.

The exchange rate in the baseline simulation, projects that the euro will appreciate quite strongly against the dollar. By the year 2007 1 euro is projected to equal to $1.22. FAPRI, at Columbia Missouri, provided analysis at the EU level for two alternative exchange rates. The first is the ESRI exchange rate forecast for the dollar/euro rate. This involved the euro appreciating over the projection period but not quite as strongly as in the baseline. By 2007 under the ESRI projections, the euro appreciates to a value of $1.13. The final scenario performed by FAPRI involved keeping the dollar/euro relationship at parity for the 2000-2007 period. The FAPRI-Ireland model was then used to trace the effects of these two alternative exchange rate scenarios. Results for the different sectors and overall income were then compared with the baseline exchange rate results. plots the paths of the 3 different exchange rates used in the analysis.

Figure 5-1: Baseline and Alternative Scenario Exchange Rates



Source: FAPRI and ESRI

The results for each sector under the different exchange rate paths are analysed below. Firstly, each commodity market is examined. This facilitates the isolation of exchange rate impacts in each market, particularly with reference to the policy environment. The implications for agricultural sector income as a whole are then examined.

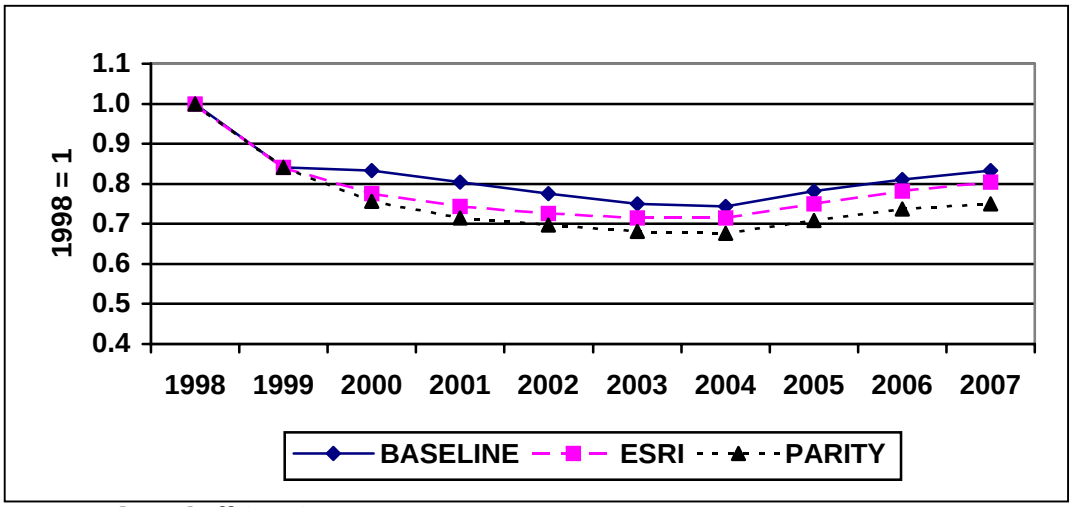
[3] In particular most of these variables are cost data such as energy price indicators, which are used in the inputs model. ESRI forecasts for national income are also used.

5.1.1 Beef and Sheep

It is important when considering the impact of alternative exchange rate paths on the beef sector to remember that the price path for beef is largely determined through the way that the Commission operates subsidised exports. The Commission response to a closure in the gap between world and EU prices is most likely to be one whereby budget savings are made through a reduction in the rate of export refund. As was shown in "Agricultural Outlook for Ireland", the number of cows and therefore the volume of output of the sector is largely determined through policy in the form of the dairy quota and suckler cow quota.

There is, however, some reaction to changing relative EU and world beef prices in the model that is used by FAPRI. This in part reflects the fact that under all of the exchange rate paths there is likely to be some export of beef unsubsidised by the end of the period, probably in the form of female beef. The ratio of EU price to world beef price is shown in Figure 5-2 under each of the exchange rate scenarios. Currently the EU model links with the world model through the US Nebraska steer price, which is acknowledged as not from a market with which the EU trades. It is assumed here that its movements will mirror that of other "world" prices.

Figure 5-2: Index of EU Beef price to world price ratio under different exchange rate assumptions.



Source: Young and Westhoff (2000).

The model allows for some reaction of exports to the new exchange rate. In addition the prices of other meats are increased. Therefore under the parity scenario the price of beef in the EU increases by 8% relative to the baseline. This is transmitted back to Ireland where a similar price increase is experienced. As the output of the beef sector is effectively controlled by policy, there is therefore only a small impact on numbers, as slightly higher weanling prices encourage more heifers to be put in calf. Overall the market value of the output of the sector is only up by 10% under the parity scenario, and by 4% under the ESRI scenario.

Figure 5-2 shows the projections for an index of the ratio of the EU reference price with the Nebraska steer price projected by FAPRI under the different exchange rate scenarios. The shape of the graph reflects the cycle in US production. The diagram suggests that in 2003 and 2004 there will be a significant closure of the gap between EU and world prices. This may facilitate the unsubsidised removal of surplus beef coming onto world markets from the ending of OTMS. It should be remembered that currently export refunds on female beef accounts for only 10% of their value. The figures suggest that unsubsidised exports of this type of beef could occur in the near future. It is unlikely, however, that male beef could be exported without subsidies to any large extent under these projections.

As the EU is a net importer of sheepmeat, and there is little scope for the volume of this to increase to any great extent, the sheepmeat sector is the least responsive to changes in the exchange rate. Any change

in the differential between world and EU prices results in a change in the level of the levy on imports. However, the increases in the prices of the competing meats in the new scenarios pull up sheepmeat prices. In the parity scenario the EU price is 7% higher than in the baseline. Again, the impact of this price increase on production is small because of the way that the ewe premia is calculated. The two factors mean that the market value of the sector is up 7% under the parity scenario, and 3% under the ESRI scenario.

5.1.2 Milk Sector

Milk production could be said to be the EU's most protected agriculture sector. In this context, it is perhaps not surprising that the differing exchange rate assumptions adopted in this analysis do not have major implications for the sector. Two factors are important in this outcome:

- EU dairy product prices tend to be well above 'world' prices, although there is some variation in the percentage difference across products.
- The milk quota system, through its cap on output, prevents any supply response to changes in milk prices induced by the effect of exchange rates on product prices.

Figure 5-3 show the ratio of EU Internal product prices to a measure of 'world' price (in the form of the FOB Northern European Port price) for the respective dairy products. For unsubsidised exports to take place on a price competitive basis,[4] this ratio would have to be less than 1. As shown below, there is no scope for unsubsidised exports of either cheese, butter or SMP, even under the most favourable dollar/euro parity scenario. The EU internal SMP price comes closer to a 'world' price than either butter or cheese under the parity scenario, but EU SMP prices are still over 30% above world prices at that point.

International commodity prices are denominated in dollars. Hence, relative to the baseline, the gap which must be filled by export refunds in order to export product from the EU is smaller under the ESRI exchange rate scenario and smaller still under the parity exchange rate scenario. Consequently, the weaker euro allows a greater volume of exports from the EU under the ESRI and parity scenarios than under the baseline. This is because the weaker euro implies a lower cost to the EU budget (in terms of export refunds) per tonne of product exported. This would facilitate higher levels of exports from the EU, resulting in lower stock levels, higher internal EU product prices and ultimately higher farm milk prices than would otherwise have been the case.

With no scope for a supply response to higher prices because of the quota restriction, the impact on the milk sector ends there. In this analysis a weaker euro against the dollar results in higher milk prices and boosts the overall value of the sector. Under the ESRI exchange rate scenario, Irish milk prices would be up over 2% on the baseline in 2007 at close to 93p per gallon. Under the parity exchange rate scenario, the milk price would be 6% up on the baseline 2007 position at 96p per gallon. With no change in milk output, the value of the milk sector under each scenario would also increase by similar amounts relative to the baseline.

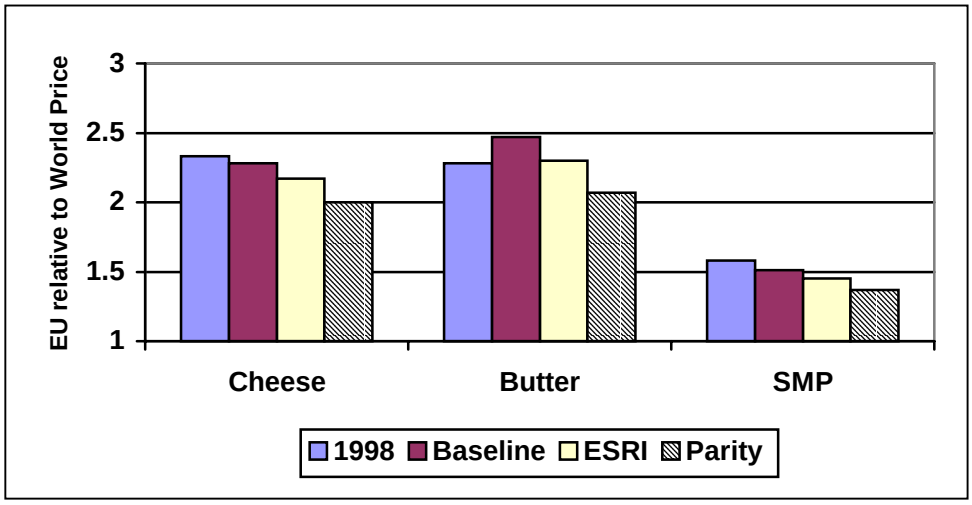
It could be argued that the Commission might take advantage of the weak euro to make budgetary savings by reducing export refunds, thereby eroding the beneficial effect which the euro exchange rate could have on milk prices. Nevertheless, it cannot be stated with any certainty that this would be the Commission's course of action.

This exchange rate analysis also highlights the importance of the future value of the euro/dollar exchange rate in the context of the EU's WTO export refund commitments. Other things being equal, any commitment by the EU to further reduce export refund limits, would place a greater restriction on EU exports were the euro to appreciate against the dollar.

[4] Unsubsidised exports from the EU of non commodity specialist cheese types do take place. These compete on attributes other than price.

Figure 5-3: Ratio of EU Internal Price to FOB Northern European Ports Price under Different Exchange Rate Scenarios

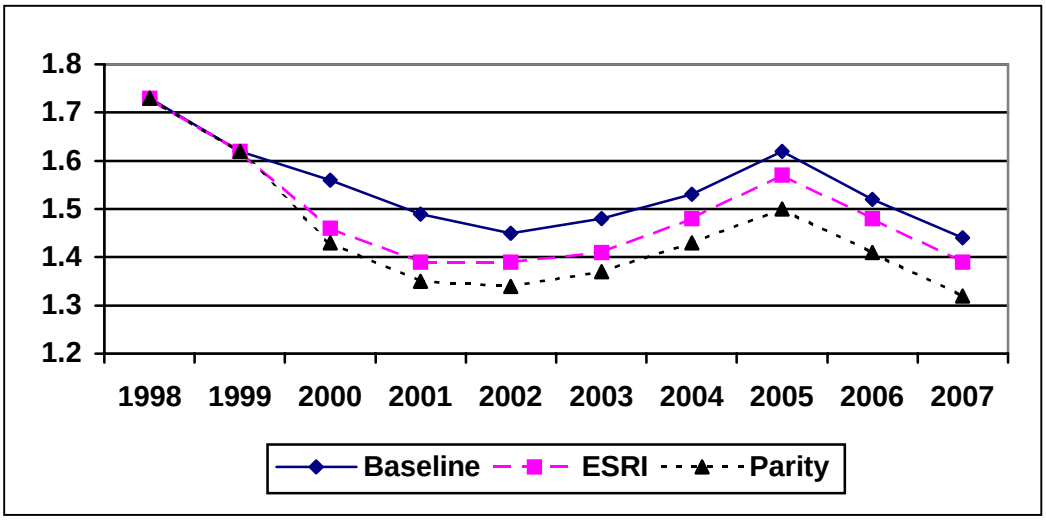
Source: Young and Westhoff (2000).



5.1.3 Pigs

The EU pig price relative to the US barrow and gilt price (used here as a proxy for a world price) is shown in Figure 5-4 under the various exchange rate scenarios. For unsubsidised exports to take place on a price competitive basis, this ratio would have to be less than or equal to one. As in the baseline, under the alternate exchange rate scenarios EU prices remain considerably above the 'world price'. Hence the export of pigmeat without subsidy is unlikely.

Figure 5-4: EU pig price relative to US Barrow and Gilt price



Source: FAPRI

Relative to the baseline outlook, the weaker euro, under both ESRI and parity scenarios, results in higher (euro denominated) world prices thereby inducing higher 3rd country exports from the EU, lower stock levels and higher EU pigmeat prices. However, in spite of higher EU pigmeat prices, EU production actually declines marginally under these alternate exchange rate scenarios relative to the baseline. Although pigmeat prices rise, pig production costs increase to a greater degree because of the beneficial

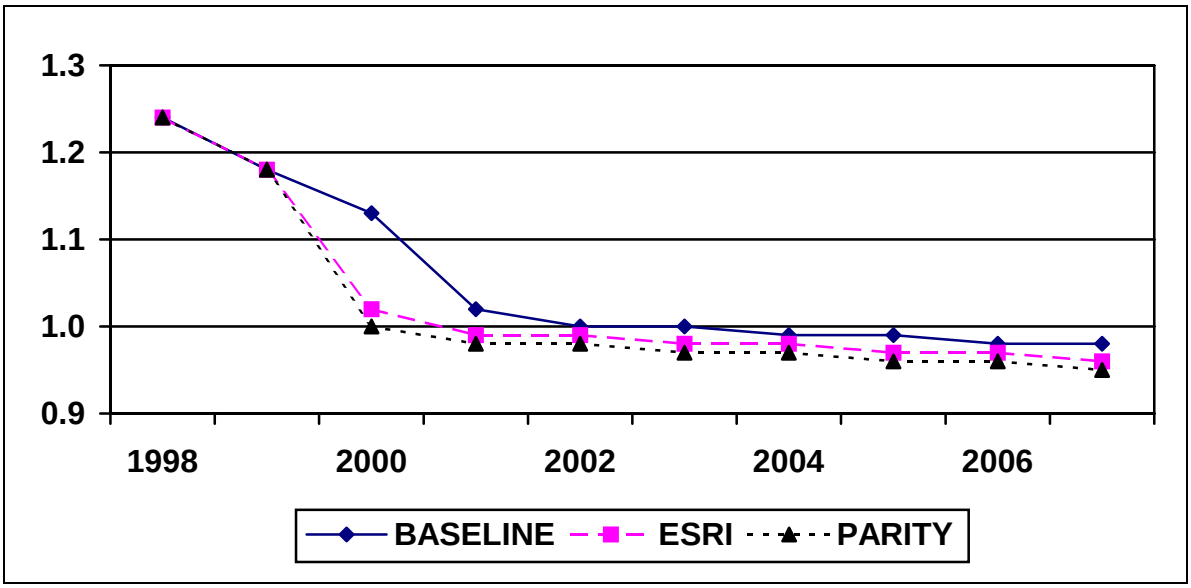
effect which the weaker euro has on EU cereal prices (feed represents a very high proportion of pig production costs).

In Ireland the effects of the alternate exchange rate scenarios are largely felt in terms of higher Irish pig prices, with only modest changes in output. Relative to the baseline 2007 position, the value of Irish pig output is up about 4% under the ESRI exchange rate scenario and under the parity exchange rate scenario the value of the sector increases by 10%.

5.1.4 Wheat and Barley

EU grain prices tend to be relatively closer to world prices than other EU commodity prices. Consequently the grain sector is the most sensitive of all of the commodity sectors to fluctuations in the euro/dollar exchange rate. The greater the strength of the dollar against the euro the earlier the EU will be in a position to commercially export grains onto the world market. By commercially exporting the produce out onto world markets internal EU prices are effectively bid up or increased. In such a scenario downward pressure is exerted on the representative world prices owing to the extra supply coming from the EU. Conversely a stronger euro delays the passage of unsubsidised grain onto world markets and thus keeps EU grain prices relatively depressed. Figure 5-5 plots the ratio of EU wheat[5] prices to equivalent world wheat prices[6] under the 3 different exchange rate scenarios.

Figure 5-5: Ratio of EU Wheat Price to Equivalent World Wheat Price under Different Exchange Rate Scenarios



From the graph it can be seen that under the baseline exchange rate the internal wheat price exceeds the world equivalent price until 2003. Thus commercial exports of wheat are only possible after this date. Under the two alternative exchange rate scenarios, the world price exceeds the internal wheat price by 2001. Thus wheat produce leaves the EU market commercially much earlier then under the baseline case.

Stronger internal EU grain prices within the EU leads to marginal shifts in land allocation towards grain area and in particular wheat area. Yield levels also increase marginally under more favourable price levels. Thus production levels in general increase across the grain sector. Stronger grain prices however increase the cost of production to the dairy and livestock sectors, with the price of feed grain witnessing some of the higher grain price. A summary of the EU results under the two exchange rate scenarios is presented in Table 5-1.

[5] EU barley follows broadly the same pattern under the 3 different scenarios.
[6] World wheat price in this context is a weighted average of US Gulf wheat price, US Gulf maize price and US Portland barley price.

Table 5-1: Comparison of EU Wheat & Barley Results under each Exchange Rate Scenario

	ESRI Scenario % Difference from Baseline 2007	Parity Scenario % Difference from Baseline 2007
Wheat Area	0.4	4.2
Wheat Production	0.4	3.7
Wheat Price	6.1	14.8
Barley Area	0.3	4.1
Barley Production	0.3	3.6
Barley Price	5.8	13.1
Set-Aside Area	0	-50.0

As expected, the largest difference in results exists between the parity scenario and the baseline. An exchange rate swing of 22 per cent results in wheat prices increasing by 15 per cent above the baseline 2007 position with barley prices increasing by 13 per cent. Both area and production increase by around 4 per cent on the baseline level for wheat and barley. Note also that under a parity scenario, set-aside levels are set at 5 per cent at the end of the projection period compared with the 10 per cent level under the baseline. The ESRI scenario produces more moderate results, but even an 8 per cent difference in the exchange rate results in prices of both wheat and barley appreciating by 6 per cent on the baseline level.

The implications of the differing exchange rates for Irish wheat and barley prices are shown in Table 5-2.

Table 5-2: Comparison of Irish Wheat & Barley Results under each Exchange Rate Scenario

	ESRI Scenario % Difference from Baseline 2007	Parity Scenario % Difference from Baseline 2007
Wheat Area	3.8	6
Wheat Production	5.3	7
Wheat Price	5.8	13
Barley Area	0.0	5
Barley Production	0.0	4
Barley Price	6.1	13
Total Cereal Area	1.0	5

Broadly speaking the effect on Irish grain prices of the two exchange rate scenarios mirror those at the EU level. Total cereal area planted increases significantly under the parity scenario with the increase mainly being attributable to the reduction in set-aside levels (from ten to five per cent). A strong recovery in prices, as per the parity scenario, results in a marginally greater increase in wheat area than barley.

5.1.5 Overall Income

The parity scenario provides the greatest contrast in the overall income picture. The relatively lower euro value under this scenario results in almost all CAP commodities experiencing higher prices than under the baseline. In the case of beef and cereals the lower relative value of the euro brings forward the date at which the EU can commercially export produce onto world markets. This has the effect of increasing internal prices for these commodities. The lower the relative euro value the earlier produce can leave the EU in an unsubsidised fashion. In the case of the dairy sector, even with the lower euro value internal EU prices remain above world prices; therefore the EU is never in a position to commercially export. However the EU is in a better position to exploit export refunds. The higher levels of exports as a consequence of this has the effect of reducing internal stock levels and raising internal prices.

Other livestock commodities such as sheep and pigs see higher internal prices due to the higher price of beef. Therefore all CAP output values are increased in Irish agriculture due to a relatively weaker euro. The weaker the euro the greater the increase in value as against baseline values. The only negative

consequence of a weaker exchange rate for Irish agriculture is the relatively higher cost of compound feed as against the baseline. This is purely driven by the higher price of cereals, which results in higher feed grain prices. Table 5-3 contrasts the difference in output values and feed grain expenditure under the different exchange rate scenarios.

Table 5-3: Comparison of Sectoral Values and Total Income under the 2 Exchange Rate Scenarios

	ESRI Scenario % Difference from Baseline 2007	Parity Scenario % Difference from Baseline 2007
Beef Value	4	10
Total Livestock Value	3	8
Dairy Value	3	6
Cereal Value	6	19
Feed Expenditure	4	10
Total Agricultural Income	2	6

The parity scenario results in total agricultural income being increased by a considerable 6 per cent on the baseline value. Under the ESRI scenario, which envisages a relatively milder appreciation of the euro against the dollar, total income is up 2 per cent on the baseline.

Readers should remember that this income outcome is dependent not alone on market supply and demand conditions but also on the manner in which the Commission chooses to operate the policy tools available to it across the sectors. For example, in the beef sector the Commission may choose to maintain a level of prices closer to the support price through further reductions in export refunds. This would reduce the value of the sector and hence reduce the level of agricultural income

5.2 Policy Developments

In this section the likely major developments impacting on agriculture in Ireland will be analysed in turn. Over the coming years the FAPRI-Ireland Partnership team will be working to provide detailed assessment regarding the impact on the EU and Ireland of different policy scenarios. At the moment, however, we are only able to produce some conclusions with reference to the projections that have been produced above.

5.2.1 WTO

The breakdown of the Third WTO Ministerial Council in Seattle in November last year was hardly the most auspicious start to the next round of negotiations. It is clear that agriculture will again play a central role in the process, and there are significant differences between the participant groups on this issue (see Matthews, 1999, for a detailed examination of this issue).

Although the Uruguay Round Agreement on Agriculture (URAA) did lead to significant reform of agricultural trade policy, it is arguable that little was achieved in terms of *trade liberalisation*. However, the restrictions on subsidised exports were one of the drivers of the recent reform of the CAP. In the case of the beef sector for example, where in the absence of support price reductions, the inability to export outside the GATT limits would have lead to a huge build up of stocks and with it the resulting budgetary costs. However, tariff rates, although more transparent than before the URAA, remain high for a number of reasons.

The four broad areas of discussion in the next round are likely to be concerned with market access, export subsidies, domestic support measures and regulatory restrictions.

Market Access

Average global tariff rates in agriculture may well have fallen by the 36% agreed in the URAA, but rates for many commodities remain high for a variety of reasons. In some cases tariffication actually resulted in a drop in market access (Josling and Tangermann, 1999). Many tariffs remain "watery" (the tariff is higher than the gap between domestic and world prices) due to a combination of reasons, including the choice of base year in the negotiations and the so-called process of "dirty tariffication". The impact of any subsequent reduction in tariff rates in the EU depends on the amount of "water" in the current rates for the relevant commodity.

The USDA have made estimates of the amount of water in current tariff rates (USDA, 1999). Of course the answers that you get very much depend on the "world" and "EU" prices that you use, and the time period considered as demonstrated by the "dirty tariffication" practice. The USDA used the period 1995-97 as a basis for their study, a period that included large changes in the relationship between world and EU prices. Over this period, the USDA calculated that tariffs were very watery for SMP, butter and eggs. Wateriness in the pork and poultry sectors was less pronounced.

In the beef sector it is more difficult to estimate the degree of protection afforded, due to sensitivity to the selection of the appropriate world price. At present the world price used in the FAPRI GOLD model is the US Nebraska steer price. This price is not indicative of the price currently received for beef from the EU when it is sold outside the EU market. If this price was used as a basis for calculation, then the tariffs would be more watery than if a price such as the Argentine or Australian price were used. In fact, calculations for all the meats are difficult due to the different qualities and degrees of processing involved, with imports of frozen poultry occurring outside the tariff rate quota (TRQ), despite the USDA calculating wateriness in some tariffs.

For cereals we have seen in the results above thatprices are set to fall by about 8% in the baseline which would reduce the degree of wateriness, although under the weaker euro scenarios this drop would be smaller. In the beef sector the convergence between the EU and world beef price outlined in Figure 2 will result in an increase in the degree of water in tariffs on imports. For SMP and butter the degree of wateriness would be reduced.

It is likely, therefore, that there will continue to be significant water in import tariffs over the projection period for the beef and dairy sectors. It is likely, therefore, that even if there were significant reductions in the tariff rates the changes would merely wring out some of the water (Swinbank, 1999). An extension of TRQs, or rule changes facilitating better use of existing ones, would result in particularly important consequences for the lamb and poultry industries.

Export Subsidies

It is clear, even in the aftermath of the ill-fated Seattle Conference, that pressure for the elimination of export subsidies (fundamental to the EU's dairy and beef price support mechanisms) from those WTO members advocating freer trade, still remains intense. Ireland is a major exporter and has typically accounted for a large proportion of subsidised exports from the EU. Any reduction of allowed levels will have implications for Ireland and it is likely that this will occur as a result of the next round. Sectors that are particularly vulnerable are the beef and dairy sectors.

For the beef sector, it has been shown under the specific assumptions of the baseline analysis, that there is scope to reduce subsidised exports in the latter period of the projection and still retain a price drop above that where aids to private storage might be triggered. The discussion above shows that the scope to do this will depend to a large extent on the exchange rate, with a weaker exchange rate significantly increasing the room for manoeuvre.

In this respect a lot will depend on the response of the sector to the supply control measures introduced as part of the Agenda 2000 reforms. Many experts would see the drop in suckler numbers outlined above as conservative, yet even under this scenario there is a big reduction in the volume of beef produced in Ireland. If outlets in the EU can be maintained, then the volume of beef that has to be disposed of on

world markets is reduced. The ability to hold on to or build markets in the EU is heavily dependent on the quality of the cattle available for slaughter.

The subsidised export limits agreed for dairy products in the last WTO round reflected the composition of EU dairy product production at the time. Since then however, there has been a substantial shift away from butter and SMP in favour of cheese production in the EU. Consequently, a mismatch emerged between the GATT export limits and production. As a result, the export limit for cheese has become binding. On the other hand, SMP and butter exports particularly, are running well below their respective limits. If further reductions in subsidised export limits are introduced through the WTO Millennium Round these will probably have greater implications for cheese and SMP exports than for butter. It would require quite a substantial cut in the subsidised butter export limit before the limit would become binding. At present there is no indication of the extent of any further export subsidy reforms so we are not in a position to speculate about the magnitude of the decline in dairy product and farm milk prices that might result.

Cutbacks in the level of export subsidies available to the Commission are also likely to have an affect on the cereals sector. This is particularly the case if the euro appreciates quite significantly against the dollar. Reducing the level of export subsidies in a context where EU grain prices remain above world prices will significantly constrain the manner in which the EU can provide support for internal prices. All of this must be seen against a backdrop where the direct income compensation measures agreed last year as part of the Agenda 2000 package only compensate producers for half of the reduction in support prices.

Domestic Support Measures

The URAA required member countries' Base Aggregate Measure of Support (AMS) to be reduced by 5% over a six year period. Exceptions were negotiated and these were divided into the green and blue boxes. The green box includes policies that are totally de-coupled from production and environmental and regional assistance programmes. The majority of the direct payment schemes operated by the EU fall into the blue box category, indeed it is mostly policies from the EU that are covered. The blue box category is subject to a 'peace clause' that will be reviewed in 2003.

This is also an area where beef is particularly vulnerable, since the payments made to the sector are directly coupled to production. As the proportion of farmers' income from payments rise there may be additional objections from groups in the EU, and even within the industry, as the distortions from the support methods become apparent. However, any de-coupling of policies is likely to result in a large reduction in the number of cattle and production of beef.

The sheepmeat sector is also vulnerable under the WTO, as its payment scheme is also fully coupled. The method of calculation of the ewe premia is also under attack from producers in both Ireland and the EU. Also, any agreement that improved market access would also impact directly on market prices.

One of the more contentious issues in the debate is the question of compensation payments in the cereals sector. Debate is likely to centre on whether these payments are in actual fact totally decoupled from production. Whilst the EU may well want to argue that such payments are in fact decoupled, and as such belong in the green box, other parties may well argue that they are not, in which case they will come under significant pressure during negotiations. In an Irish context, any changes to the compensation system would have serious repercussions for the cereals sector, as under present low prices many contend that the compensation payment presently constitutes the entire profit margin for many producers, with market returns merely covering costs.

Regulatory Restrictions

The long running dispute between the EU and the USA regarding trade in hormone treated beef is an indication of the likely importance of health and safety issues in the future operation of the WTO. It may be that as countries are forced to reduce levels of traditional methods of support under other areas of the WTO, there will be increasing recourse to regulatory restrictions in order to hinder the import of sensitive

goods. The debate over these restrictions is occurring simultaneously with an increase in EU consumer concerns regarding the safety of their food as a result of BSE, dioxin scares, and GMOs.

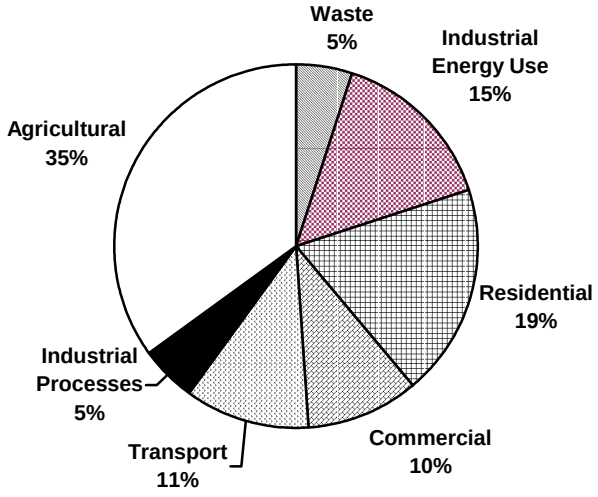
Under the Decision on Sanitary and Phsytosanitary Measures, countries can apply measures to protect human, animal and plant life and health as long as they do not constitute a "disguised restriction on international trade". An important issue arises where scientific evidence is not conclusive, or scientific opinion differs. The Commission is poised to publish document in relation to the "Precautionary principle" outlining why the EU feels justified in blocking sale of product for health reasons (Agra-Focus, 2000). It is argued that risk analysis should also consider "unquantifiable facts and circumstances". This issue will increase in importance if the EU were to attempt to block the important of newly developed GMOs that are already considered safe in the US.

Within the EU, responsibility for EU Food Law has been moved away from the Directorate-General for Industry to Health and Consumer Protection. The Commission has also published a White Paper on Food Safety aimed at restoring consumer confidence after several recent food scares. In the beef sector, September 2000 will see the introduction of compulsory animal and slaughterhouse identification, allowing the determination of member state of origin. This will result in a level of tracability in excess of anything outside the EU.

5.3 Environmental Concerns -The Kyoto Protocol

Environmental considerations are likely to have an increasing impact on the agricultural sector in coming years. The Kyoto protocol set out specific targets in terms of limiting the growth of six greenhouse gases: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_20), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6). Targets for emission levels by 2010 were set out using 1990 as a base year. Emissions of the six gases are aggregated in terms of the "global warming potentials" (GWP) which in turn are a measure of their relative warming effect. Figure 5-6 illustrates the source of emissions according to end uses of energy.

Figure 5-6: Greenhouse Gas Emissions by End User in 1995 (Excluding Land Use Change & Forestry)



Source: Environmental Resource Management

In 1995 the total amount of these GWP was estimated to be 59.4 million of CO_2 equivalents. This constituted a 4.3 per cent increase on the 1990 level. As illustrated above, In the Irish economy agriculture is the single largest source of emissions. At 35 per cent, the total amount accounted for by agriculture is disproportionately large when compared with other developed countries. In particular the contribution of methane and nitrous oxide to total emissions is unusually high. In formulating a national

strategy for the limitation and reduction of CO_2 equivalents the total and marginal cost to each relevant sector of emission level reductions must be estimated. As a result, the least cost of reduction for the economy as a whole can be identified.

The FAPRI-Ireland model is ideally placed to analyse the implications for the agricultural sector of any policy changes provoked by adherence to Kyoto. In particular, the magnitude of the sectoral income implications of restrictions on livestock numbers or fertiliser application can be simulated. It should also be noted that the policy changes (in particular the decoupling of payments) outlined above, will also have impacts on the emissions and nitrogen application and these impacts will be produced by the models.

5.4 EU Enlargement

Increasingly the EU has looked to devise policies to deal with issues outside its borders. One way in which it has done this is by negotiating European Agreements with Central and Eastern European Countries (CEEC). For these states, the ultimate goal has been full membership of the EU and since 1993 the EU now accepts that any European state can apply for membership.

Since that time, the EU has been in a process of preparation for CEEC accession. While it is accepted, by all, that enlargement is necessary and inevitable, many member states remain concerned about the potential consequences which enlargement will have for the existing system of support structures.

In July 1997 the Commission published its Agenda 2000 proposals. These included an assessment of the applicant countries and proposals for internal EU change. Initially agreement was reached to open negotiations with six countries - Poland, Hungary, the Czech Republic, Estonia, Slovenia and Cyprus - the so-called 'first wave'. At that time the view was that the other applicants were to be reviewed each year to see if they should join this first group. Subsequently, there has been pressure to fast track the whole process, and it is now possible that as many as 13 new member states may join the Union in the medium term.

Eastern enlargement differs markedly from previous enlargements such as the most recent expansion, which brought about the inclusion of Austria, Sweden and Finland in 1995. The key difficulties are that unlike previous accessions, the number of states wishing to join is much larger, they are much poorer and, in particular, they are more agricultural than even the poorest of the current EU member states.

Accordingly, if enlargement is to be achieved, the EU will face difficult decisions in relation to the CAP. It was hoped that the Agenda 2000 reforms would provide a footing to make the CEEC accession process easier, but it is highly questionable whether the depth and extent of the reforms agreed in Berlin achieve this aim.

A key problem is that pressure exists within the existing 15 member Union to defend the European model of agriculture, including protection against free trade and the maintenance of direct support to farmers. This protection comes at some cost to the EU budget. It is almost inevitable that when CEEC's join the Union, farmers in these countries will also receive some form of CAP direct payments. Recently, Commissioner Franz Fischer, stressed the importance of a transitionary period for these new members, if new commodity surpluses are to be avoided. The great fear is that a dependency culture may take hold in the new member states, with processors producing with intervention as the main market in mind.

The countries in the first wave have now submitted their position papers in which they outline the circumstances under which they envisage themselves becoming members. Perhaps unsurprisingly, there is little interest from the applicant countries in a transition period to full membership. These papers are currently being evaluated by the Commission. The next step will be for EU agriculture ministers to respond with their views on each EU applicant. Formal negotiations should begin later this year. A key challenge for the applicants will be the adoption of the *Acquis Communitaires* - the substantial body of EU legislation.

As few details of the enlargement process have so far been agreed, the FAPRI-Ireland Partnership has yet to examine the possible consequences from an Irish perspective. However, we are in a position to summarise some of the issues, which will be of consideration to the key agriculture sectors and draw some conclusions accordingly.

In the beef sector, Ireland has seen a large increase in the export of young animals to the feedlots on continental Europe over the past year. It is likely that such exports will face competition from CEECs in this market. Again, this issue is linked to the evolution of EU policy and how it is implemented in the CEECs. If payments remain coupled to production in the EU, but are not extended to the CEECs then weanling prices in the CEECs will be especially competitive.

Some studies have indicated that the expansion of the EU to include the CEEC's, would result in a large increase in the production of beef in these countries. The outcome will depend on both the level of prices prevailing in the EU at the time, and whether the compensation payments will be extended to CEECs. One of the justifications for manipulation of export refunds in the manner that we have in the projections presented here is that the EU may wish to see low beef prices on enlargement, in order that the CEECs do not subsequently experience a price drop for which they must be compensated.

In the projections of output of beef from the CEECs produced by the European Commission (1999) under similar "baseline" assumptions to those used by FAPRI, there was a significant downwards revision in production levels from those projected in 1998. This is because beef production in the CEEC's is sourced mainly from dairy herds, and the numbers of dairy cows has fallen significantly in recent years. The potential of these countries to expand beef production as a result of enlargement will, therefore, be strongly linked to the implementation of any quota restriction.

The milk quota situation, which is apparently resolved for the medium term, provides yet another unknown in the context of EU enlargement. While it is the stated policy of the Commission to retain quotas to 2008 at least, internal and external difficulties may call this intention into question.

From the internal perspective there will be pressure on the quota system in 2003. More recently it seems that Germany and perhaps Spain may join the four established anti-quota countries, (UK, Denmark, Sweden and Italy), in opposition to its continuation. This may hasten the demise of supply control.

Related to this is the external pressure on the quota which may be generated by CEEC accession, particularly given the problems that the system might cause for new members. Apart at all from the issues involved in ensuring that the quota system would be properly administered in these new member states, there is the more fundamental problem of setting the level of quota these countries would receive. This is particularly the case given that average production levels in these countries in recent years would actually be substantially below the levels achieved earlier in the 1990's. Lower quotas would, other things equal, hinder the export potential of these relatively low cost producers and would diminish their potential impact on EU dairy product markets or on third country markets supplied by the EU.

Both the EU Commission and FAPRI's projections show an increase in cereal production levels in CEECs over the next seven years. In both cases production increases tend to be more a function of increases in yield rather than any substantial increase in cereal area. Both sets of projections suggest a substantial increase in domestic demand for cereals. Most of this increased demand comes from increased consumption of cereals in feed grain diets due to increased meat production. The Commission projections still show a net balance of exportable cereals with supply still exceeding consumption. FAPRI on the other hand show Eastern European states as net exporters of maize, while being net importers of barley and wheat by 2007.

The recent Agenda 2000 reforms will effectively have the effect of narrowing the gap between EU internal prices and world prices. However many EU producers are increasingly reliant on compensation payments to act as profit margins in a low price environment. The relative competitiveness of present EU producers versus CEECs will inevitably depend on what type of compensation package (if any) is offered to CEECs upon entry.

5.5 Other Issues: Market Support and EU Budgetary Concerns

The main issues that have been addressed thus far in this paper have related to the future strength of the euro, the outcome of the next WTO trade round and the possible implications of EU enlargement. In addition to these concerns there are a number of other issues which will occupy the attention of policy makers, food processors and farmers over the coming years.

As we have already been noted, there may be pressure to reform the beef sector CMO other than from the WTO or enlargement. One possible source is as a result of budgetary pressure from within the EU. The figures presented above project a fall in expenditure on export refunds as a result of converging prices and lower volumes.

The projections above show that there will be a dramatic shift in the sector with regard to the proportion of income that farmers receive from payments. Several commentators have noted that the revenue from these payments often accounts for more than 100% of the income that the farmer receives. Under the Agenda 2000 proposals as they stand at the moment, this dependency is likely to increase. This will inevitably lead to pressures to justify the affordability of the support measures.

In addition, in calculating an indication of the revenue of the sector, all the premia are included. Because of the capitalisation of payments into the price of young animals, it is inevitable that some of the value of the payments accrue not to beef producers but to dairy producers and landowners. It is inevitable that there will be pressure from some quarters to reform the policy, and direct policy instead at emerging rural development and environmental objectives.

In coming years the budget for the EU dairy sector may come under increasing pressure. In agriculture, with tighter overall budgetary control now an expressed priority, savings may need to be made. Recent reforms to the regimes applied to sectors other than milk production have tended to diminish or eliminate market price support in favour of direct payments.

A consequence of the move to direct payments is that it leaves more limited flexibility to change the cost of support in these sectors. In the dairy sector, even though direct payments are to be introduced on a limited basis, market prices remain the main mechanism for the delivery of support. As a result, the possibility exists that the dairy sector could become a valve through which the European Commission would ease pressure generated elsewhere on the agriculture budget - for example, by reducing dairy product export refunds.

The two major reforms of EU agriculture conducted throughout the 1990's have seen support prices for grain reduced by 45 per cent. It is widely envisaged that by the time the Agenda 2000 reforms have fully permeated the market that internal EU grain prices will have moved substantially closer to world market prices. Their exact location in relation to world prices will probably be a function of exchange rate movements. However provision still exists for a revision of price support levels within the existing policy framework. The original Agenda 2000 reforms suggested a 20 per cent price reduction in support levels. Thus there is the possibility of an additional 5 per cent reduction in support prices over the next seven years.

Compensation payments for the cereals sector were increased under the Agenda 2000 reforms. In an Irish context these payments are set to form an increasing proportion of producer income levels. Any budgetary pressure which results in these payments being reduced is likely to affect producer income quite substantially.

5.6 Conclusions and further work

One year on from a major reform of the CAP, there are strong indications of further policy changes that will have major impacts on Irish agriculture. There are pressures from outside the EU, in the form of WTO negotiations and Kyoto Protocol. There are also likely to be developments from within the EU as a result of the prospective enlargement to include CEECs.

The Agenda 2000 reforms were to some extent a response to these pressures, with price reductions likely for most sectors. As prices fall towards world levels the volatility of prices is likely to increase, and this has been illustrated in our simulations under different exchange rate scenarios. Here it is shown that, depending on how the EU manages the markets where it can, prices in Ireland could fluctuate considerable as the euro moves against other currencies.

Incomes, however, do not fluctuate to the same extent as prices for two reasons. First, supply in the case of the major commodities, is determined by quotas, and therefore the supply response is small. Second, the proportion of income that comes from payments increases, and the value of these is virtually fixed. The payments themselves will come under pressure in the future, because of the WTO negotiations, internal budgetary pressures and also because of their perceived inefficiency.

Over the coming years, therefore, the FAPRI-Ireland Partnership will carry out major studies on these and other issues, using the tools that have been outlined here. By applying the scenarios to the models developed with the extensive input from industry experts, it is hoped that a large body of high quality research on policy analysis can be made available to policy makers, those in industry, academics, and producers. All those involved in the Partnership thank those who have been involved up to this point. All engaged in the agri-food sector are invited to contact members of the partnership, either for further information or to get involved. To a large extent it is our clients who will determine our future work plan.

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Appendix B

Table B1 : Agricultural Output, Input and Income **Parity Scenario % Difference From Baseline**

Commodity	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Livestock (incl. Stock changes)	**0.00%**	**-1.59%**	**4.53%**	**6.64%**	**7.87%**	**9.31%**	**9.58%**	**8.85%**	**8.67%**	**8.41%**
Cattle	0.00%	-3.57%	5.12%	7.63%	8.82%	10.73%	11.31%	10.61%	10.42%	10.02%
Pigs	0.00%	4.68%	3.97%	7.02%	8.87%	10.69%	10.92%	9.87%	9.46%	9.12%
Sheep & Lambs	0.00%	-0.39%	4.97%	4.63%	6.98%	7.65%	7.14%	6.77%	6.65%	6.96%
Horses	0.00%	1.37%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Poultry	0.00%	1.42%	4.25%	6.97%	7.69%	8.13%	8.14%	6.91%	7.11%	7.30%
Livestock Product	**0.00%**	**-0.84%**	**2.43%**	**3.20%**	**3.53%**	**3.81%**	**3.91%**	**4.05%**	**4.90%**	**5.90%**
Milk	0.00%	-0.86%	2.52%	3.37%	3.75%	4.09%	4.23%	4.39%	5.28%	6.32%
Eggs	0.00%	0.00%	-1.67%	-5.78%	-9.14%	-12.17%	-14.23%	-14.17%	-14.02%	-14.08%
Wool and other products	0.00%	0.00%	-2.42%	-1.74%	-0.27%	0.08%	-0.09%	0.06%	0.05%	0.06%
Crops (incl. stock changes & turf)	**0.00%**	**0.50%**	**0.65%**	**2.38%**	**2.84%**	**3.53%**	**3.52%**	**2.58%**	**3.44%**	**3.64%**
Barley	0.00%	1.29%	2.21%	9.69%	11.35%	14.52%	15.13%	12.34%	15.59%	15.92%
Wheat	0.00%	1.80%	4.86%	13.38%	17.85%	21.98%	23.99%	20.14%	25.76%	28.74%
Oats	0.00%	1.50%	3.81%	15.84%	17.50%	24.66%	26.93%	22.41%	27.88%	28.02%
Potatoes	0.00%	1.29%	-0.60%	-1.92%	-3.39%	-4.87%	-6.30%	-7.50%	-8.52%	-9.48%
Sugar Beet	0.00%	1.14%	-0.64%	-0.88%	-0.94%	-1.10%	-1.14%	-1.08%	-1.14%	-1.14%
Fresh Vegetables	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Fresh Fruit	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Other Crops	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Gross Agricultural Output	0.00%	-1.62%	3.26%	4.83%	5.58%	6.44%	6.58%	6.17%	6.53%	6.79%
Total inputs of materials and services	**0.00%**	**-0.95%**	**2.07%**	**2.79%**	**3.44%**	**4.32%**	**4.91%**	**4.87%**	**4.95%**	**4.87%**
of which:										
Feeding stuffs	0.00%	-0.56%	2.98%	5.30%	7.00%	9.20%	10.61%	10.55%	10.38%	10.24%
Fertilizers (incl. lime)	0.00%	0.00%	6.86%	3.68%	2.61%	2.29%	2.21%	2.12%	2.43%	2.44%
Seeds	0.00%	0.46%	0.46%	2.13%	2.68%	3.44%	3.71%	3.07%	2.46%	2.41%
Energy and lubricants	0.00%	-0.32%	-0.32%	0.40%	0.68%	0.92%	1.21%	1.42%	1.71%	1.71%
Maintenance, repairs, etc.	0.00%	-0.04%	-0.04%	0.77%	1.47%	2.11%	2.66%	2.96%	3.32%	3.35%
Services	0.00%	0.09%	0.09%	0.28%	0.51%	0.75%	0.93%	1.01%	1.03%	1.01%
Imports of store animals, poultry etc.	0.00%	5.51%	4.33%	6.70%	7.64%	8.12%	8.09%	6.95%	7.11%	7.30%
Crop protection products	0.00%	-0.25%	-0.25%	-0.47%	0.29%	0.21%	0.19%	0.11%	1.94%	1.93%
Veterinary pharmaceutical products	0.00%	0.05%	0.05%	0.16%	0.33%	0.49%	0.61%	0.66%	0.68%	0.66%
Other (detergents, small tools etc.)	0.00%	0.00%	0.06%	0.23%	0.47%	0.61%	0.74%	0.81%	1.07%	1.07%
Gross agricultural product at market prices	**0.00%**	**-2.45%**	**4.73%**	**7.29%**	**8.22%**	**9.10%**	**8.68%**	**7.84%**	**8.62%**	**9.42%**
Subsidies (e.g. livestock headage, T.B. and brucellosis eradication payments, area aid payments, etc)	0.00%	-0.13%	-4.63%	-7.55%	-7.22%	-4.24%	-1.08%	-0.97%	-0.90%	-0.88%
Agricultural levies (e.g. EU co-responsibility levy on sugar beet, disease eradication levies, etc.)	0.00%	0.00%	-0.29%	-0.08%	-0.07%	-0.15%	-0.41%	-0.60%	-0.72%	-0.73%
Gross agricultural product at factor cost	**0.00%**	**-1.55%**	**0.79%**	**0.75%**	**0.99%**	**2.76%**	**4.06%**	**3.61%**	**3.93%**	**4.20%**
Depreciation	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Net agricultural product at factor cost	0.00%	-1.03%	0.98%	0.92%	1.21%	3.37%	4.95%	4.40%	4.80%	5.13%
Wages & Salaries (incl. employers' contributions to social security)	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Land Annuities	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Income from self-employment and other trading income	**0.00%**	**-1.16%**	**1.10%**	**1.03%**	**1.34%**	**3.77%**	**5.56%**	**4.96%**	**5.41%**	**5.80%**