European dairy policy in the years to come

Quota abolition and competitiveness

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This study examines and discusses recent and future developments in the EU dairy sector. Expected future market projections are discussed. Market impacts are downscaled to farm level, illustrated by quantitative effects on the Dutch dairy sector. Structural change appears to be an important factor for the sector to adjust and to maintain its competitiveness. Policy instruments are discussed which might help to get an improved soft landing and contribute to coping with price volatility.

Deze studie onderzoekt en bespreekt de recente en toekomstige ontwikkelingen in de EU-zuivelsector. De verwachte toekomstige marktprojecties worden besproken. De impact op de markt wordt teruggebracht tot op bedrijfsniveau en geïllustreerd door kwantitatieve effecten op de Nederlandse zuivelsector. Structurele veranderingen blijken een belangrijke factor te zijn voor het aanpassings- en concurrentievermogen van de sector. Er worden beleidsinstrumenten besproken die kunnen helpen bij een zachtere landing en die bijdragen aan het omgaan met prijsschommelingen.

This research has been carried out by commission of the Dutch Ministry of Agriculture, Nature and Food Quality.

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Preface

The EU dairy market situation has been in turmoil illustrated by strongly declined prices and falling incomes in 2008/2009. These developments followed important EU policy decisions to change the dairy market regime, announcing the abolition of the milk quota system in 2015 as part of the Health Check in 2008. As a response to the market disturbances and the failure to realise a soft landing many EU member states called for strengthening measures to stabilise the dairy market in the EU. The EU Commission took several measures on short notice and initiated a working group, aimed at preparing proposals for the EU's medium-term dairy policy. The Dutch Ministry of Agriculture, Nature and Food Quality requested LEI to conduct a study, which would provide an update of a 2006 dairy study 'European dairy policy in the years to come: Impact of quota abolition on the dairy sector'.

This report provides this update as well as a number of important extensions. The recent market disturbances are analysed and a number of instruments and options to achieve a soft landing helping the sector to adjust smoothly to a new situation without milk quotas are explored. In particular, the issue of price variability has been addressed.

The study has been performed by a team of LEI researchers led by Roel Jongeneel. The study was supervised by a steering committee, led by Roald Lapperre of the Ministry of Agriculture, Nature and Food Quality.

Prof. Dr R.B.M. Huirne
Managing Director LEI

Summary

This report examines EU dairy sector and international market developments. Particular attention is paid to the decline in intervention prices as applied in recent years and the possible impact of the abolition of the milk quota system in 2015. Also the potential impact of a new WTO agreement and more strict environmental legislation is analysed. The analysis is supported by model simulations focused on the Dutch dairy farm sector. Effects of extra quota expansion (up to 2015) and the production potentials after 2015 in the Netherlands are evaluated.

Long-term trends show an continuous structural change in the EU dairy sector. Currently average critical milk prices in the considered EU member states are around 34 ct/kg. Due to further agricultural and trade liberalisation a long run milk price ranging from €0.27-€0.29/kg is estimated. Furthermore, it is argued that price volatility will increase.

A key finding of this study is that the dairy policy reform requires a strong transition of the sector in all member states. The current implementation of the soft landing puts efficient member states, regions, and/or farmers at a backward position since the quota constraints they still face hamper their structural adjustment process.

Several public as well as private sector measures and instruments are presented and their pros and cons discussed. Quota enlargement (frontloading) in countries where presently quota s are still binding and/or increased tradability of quotas between member states would favour structural adjustment in the dairy sector. Forward contracts and future markets are among the options to reduce price volatility but an adequate assessment of the impact and possible contributions of these measures needs further research. Since structural change plays such an important role for the sector to adjust to the new policy and market environment, accompanying policies (Article 68 and Axis I of the second pillar of the CAP) should be used in such a way as to facilitate this transition process and contribute to the sector's long run competitiveness.

Samenvatting

Dit rapport biedt een analyse van de ontwikkelingen in de Europese zuivelsector en op de internationale zuivelmarkt. In het bijzonder wordt aandacht gegeven aan de gevolgen van de recent toegepaste verlaging van interventieprijzen en aan de effecten van de afschaffing van het melkquoteringssysteem in 2015. Ook wordt rekening gehouden met een mogelijk nieuw WTO-akkoord en aanscherping van milieuwetgeving. De gevolgen van deze ontwikkelingen worden doorgerekend voor Nederland. Aandacht wordt besteed aan de mogelijke effecten van extra quotumuitbreiding en wat er na 2015 met betrekking tot de Nederlandse melkproductie mag worden verwacht.

Lange termijn trends wijzen uit dat structurele aanpassingen in de Europese zuivelsector steeds hebben plaatsgevonden. De huidige gemiddelde kritische melkprijs in de meeste EU-landen bedraagt 34 ct/kg. Vanwege liberalisatie van landbouw- en handelsbeleid wordt een lange termijn melkprijs van €0,27-0,29 per liter ingeschat. Bovendien zullen prijsfluctuaties toenemen.

Een belangrijke uitkomst van deze studie is dat de hervorming van het zuivelbeleid een sterke aanpassing in de sector teweeg zal brengen in alle lidstaten. De huidige ‚maatregelen ten behoeve van een zachte landing brengt de efficiënte lidstaten, regio's en boeren in een nadelige positie omdat de quotabeperkingen die zij nog ervaren, hen belemmert in hun aanpassingsproces.

Diverse publieke en private maatregelen en instrumenten worden gepresenteerd en hun voor- en nadelen besproken. Quotumuitbreiding (frontloading) in landen waar het quotum nu nog bindend is, en/of meer mogelijkheden voor verhandelbaarheid van quotum tussen/binnen lidstaten zou de structurele aanpassingen in de sector vergemakkelijken. Termijncontracten en termijnmarkten zijn opties om prijsfluctuaties te dempen maar een gedegen analyse van de mogelijke effecten van deze maatregelen vergt meer onderzoek. Omdat structuurveranderingen zo'n belangrijke rol spelen voor de sector om zich aan de veranderende beleids- en marktomgeving te kunnen aanpassen, zullen de begeleidende maatregelen (Artikel 68 en Axis I van de tweede pijler van het GLB) een belangrijke faciliterende rol spelen bij het versterken van de concurrentiepositie van de sector op langere termijn.

1 Background

The present EU dairy market regime combines price support, through measures like intervention buying, import tariffs and export subsidies, with milk quotas to limit production levels. The 2003 Luxembourg Agreement on reform of the Common Agricultural Policy (CAP) implies that the quota system will be abandoned on 1 April 2015. At the same time stepwise intervention price declines (butter -25%; SMP -15%) and a decoupling of the milk premiums were introduced. The Health Check of the CAP (2008) introduced a soft landing policy of gradual annual quota increases and a smooth induced price decline as a strategy to anticipate the quota abandonment in 2015.

Whereas the announced policy reforms aim at a gradual phasing out of the quota system, in the meantime there was a period of significant price instability. The strong price fluctuations, in particular the sharp price decline experienced in 2008/09, raised questions amongst several stakeholders as to the robustness and sufficiency of the EU's dairy policy. As such the planned and promised soft landing was not realised, but rather producers faced a strong negative price shock and in the large majority of member states the quotas became no longer binding.[1] The main aim of this study, which has a particular but not exclusive focus on the Netherlands, is to explore options to still achieve a soft landing, without questioning the quota abandonment policy choice in 2015 as this was made in the 2003 Fishler reform.

As a response to the market disturbance and the failure to realise a soft landing many EU members states called for strengthening measures to stabilise the dairy market in the EU. The EU Commission proposed a package of support measures on short notice (public intervention, private storage aid, export refunds, dairy product promotion program, direct payments, et cetera) but clearly stated not to reverse the policy of gently phasing out milk quotas. In October 2009 European Commissioner for Agriculture and Rural Development Fischer-Boel introduced a High Level Group (HLG), which was tasked to look at the long term future of the EU dairy sector. In particular, the HLG will study whether new arrangements should be put in place which can further contribute to stabilising

[1] An exception was the Netherlands, where quotas were still binding and despite facing a bad income situation the dairy sector recently still had to pay about €40mln superlevies.

the market and producers' incomes, reducing price volatility and enhancing market transparency.

Although no agreement is yet reached, there still is a process of ongoing international trade liberalisation. Further reduction of export support and market protection in the framework of WTO may push EU milk prices further down, to a level where the quota system may not be effective anymore and make the EU dairy product prices more sensitive to fluctuations. The impact of quota removal may importantly be affected by its timing and conditions, as a Dutch study, exploring the consequences of quota abolition in 2015 or earlier for the dairy chain in the Netherlands, shows (Van Berkum et al., 2006).[1]

This study addresses past trends in the sector's structure, in milk prices and sector's income developments, followed by an estimation of the most plausible EU price developments in the medium term. Based on recent literature this report is a state of the art of studies into the effects of EU quota abolition on the dairy market. The Dutch case is used to illustrate the impact quota removal may have under different policy scenarios. The study, which takes the main course of the EU dairy policy reform as given, further explores transitional policies that could accompany the phasing out of the milk quota system in order to smoothen structural changes and enhance the international competitive position of the European dairy sector. Pros and cons of different measures are evaluated and also some linkages are considered. Consultations of experts in the policy and dairy business circle have been part of this process.

[1] An English summary of this study was published as *European dairy policy in the years to come: ways to quota abolition*. LEI, The Hague, 2006. This study relies on this past work.

2 Trends in dairy farm structures, milk prices and dairy farm income

This chapter provides an overview of the farm size evolution as well as of the past trend in dairy farm income. Moreover it provides information about revenues and costs of production, both regarding their height and composition.

Over the last decades the European dairy farm sector has gone through a tremendous structural change. In this report this is illustrated for the EU-9 countries, because only for these countries data are available for the period from the start of the dairy quota system in 1984 (see Table 2.1). These nine EU member states together produced in 2009 some 85% of milk in EU-27. Since 1983 the number of dairy farms in EU-9 has shown a strong decline. The strongest decline in the number of dairy farms occurred in Italy (-81%) and Denmark (-85%). As Table 2.1 further shows, the average size of a dairy farm increased substantially in all countries. Increase in scale of production over the years was strongest in these countries, while also Germany and Ireland show strong dairy farm scale increase. Except for Denmark, the size of the farms in these countries was rather low in the base year. Dairy farms in the UK and the Netherlands were the biggest in the EU-9 in 1983 and still belong to the category having the highest amount of dairy cows per farm in 2007.

Table 2.1 **Number of farms with dairy cows and cows per farm in 1983 and 2007**

	1983		2007		Index 2007 (1983 = 100)		
	farms	cows/farm	farms	cows/farm	farms	cows	cows/farm
Belgium	48,740	20	13,320	39	27	54	197
Denmark	35,480	28	5,380	101	15	55	362
Germany	396,920	14	101,070	40	25	73	288
France	420,430	17	93,120	41	22	53	241
Ireland	91,440	18	21,320	50	23	64	276
Italy	331,530	8	62,790	30	19	71	376
Luxembourg	2,510	27	1,090	37	43	59	136
Netherlands	63,540	40	24,510	60	39	58	150
UK	57,600	58	28,140	69	49	58	120

Source: Eurostat, adapted by LEI; Germany in 1983 excluding former DDR.

Behind these averages presented in Table 2.1 there are large differences in farm size in each country. In Denmark and the UK a larger part of the dairy farms have over 100 milk cows (see Table 2.2). Also in Italy and Germany a substantial share of cows is on farms with more than 100 cows. At the same time most other member states still have a large share of farms with a herdsize of less than 50 dairy cows.

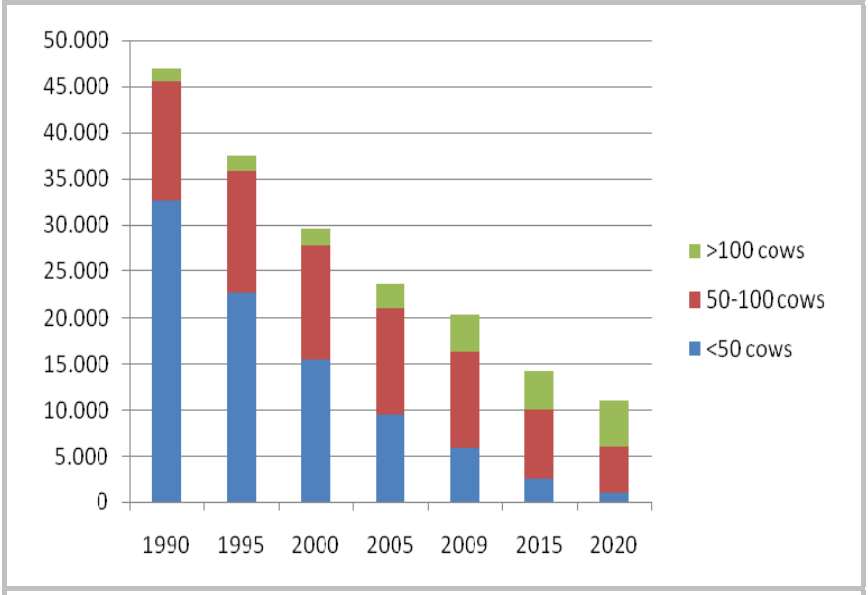
Table 2.2 **Number of dairy cows and farms and cows by number of cows in 2007**

	cows (x 1,000)	<50 cows		50-100 cows		>100 cows	
		farms (%)	cows (%)	farms (%)	cows (%)	farms (%)	cows (%)
Belgium	524	70	46	26	44	3	10
Denmark	545	29	7	25	18	46	75
Germany	4,076	76	41	19	31	5	27
France	3,815	71	51	27	42	2	7
Ireland	1,058	56	33	37	50	6	17
Italy	1,891	82	34	11	25	7	41
Luxembourg	40	77	54	22	38	2	8
Netherlands	1,468	42	17	44	52	13	30
UK	1,953	51	8	22	23	27	68

Source: Eurostat, adapted by LEI.

In the Netherlands in 2007 most cows were on farms with 50 to 100 cows (Table 2.2). Figure 2.1 presents the development in the structure in the Netherlands based on size classes (number of cows), indicating the strong decline especially in the number of the small farms between 1990 and 2009. Extrapolating this trend to 2020, the number of mainly specialised dairy farms are projected to fall from 20,000 in 2009 to about 11,000 in 2020. The share of small farms in the total number of dairy farms is estimated to decrease from nearly 70% in 1990 to less than 10%, while the share of the 'large farms' with more than 100 cows would increase from 3% to about 45% in 2020.

Figure 2.1 **Development of the number of Dutch dairy farms, size classes, 1990-2020**



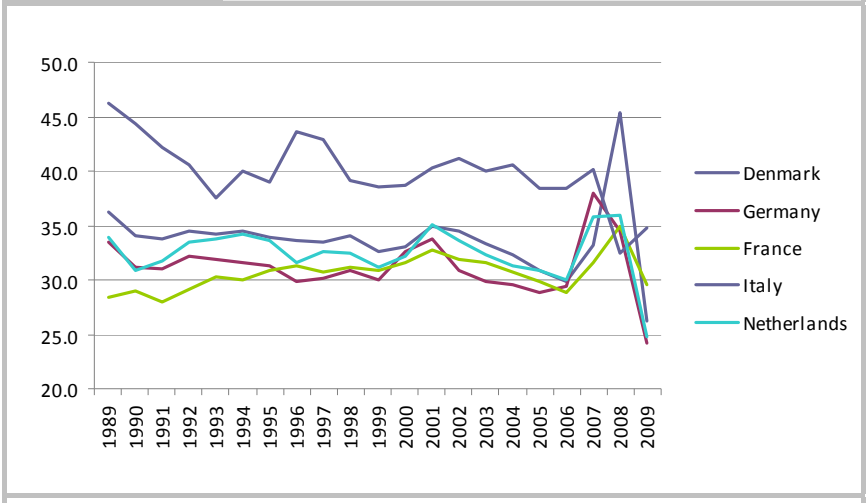
Source: Silvis et al. (2009).

Figure 2.2 presents (farm-gate) prices for milk in several EU member states. In Italy farmers receive the highest price as a consequence of specific conditions on the Italian dairy market (specialised cheese and imports of milk and dairy products), but incidentally, as a consequence of financial problems in a dairy company, in 2008 milk prices in Italy were more or less equal to the level in other countries. Prices in France have been upward in the 1990s, while in other countries milk prices have been rather stable over these years. During the years 2001-2006 milk prices have gradually declined in about all member states. The calculated average milk price paid was around €32/100kg in 2001 and declined in the five following years to around €28-29/100kg in 2006 (-11%). In fact until 2007 milk prices did not go down as much as might be expected on the base of the Luxembourg Agreements (-/-20%). A main reason for this was that the intervention price level was no longer binding (e.g. SMP). In this period the EU introduced milk premiums (€3.55/100kg milk) as a compensation for the 2003 Fishler reform of the dairy policy decided in 2003. Together with the national envelope the compensation (milk premiums which are now in-

tegrated into the single payments per farm) in these years was sufficient to absorb the decrease of milk prices.

As will be discussed more in detail in the next section, in 2007 milk prices increased to a very high level, while in the second part of 2008 however dairy and milk prices strongly decreased. In 2009 milk prices reached a level which was about 30% lower than in peak years 2007 and the first part of 2008, but only 10% lower than in the more normal years before the strong price increase.

Figure 2.2 **Development of the milk price received by dairy farmers in 5 European countries (in €ct/kg)**



Source: FADN till 2007; 2008-2009 Dutch Dairy Board.

Income development

As far as FADN data are available (until 2007) the results indicate on average show an improvement of the incomes of dairy farms in EU-9 (Table 2.3). The decline in milk price was more than compensated by the milk premium as well as by the increase in farm scale (labour productivity). More recently (2007-2009), with the fluctuation of milk prices, however, incomes of dairy farmers also fluctuated very strongly. For example, in 2007 on average Dutch dairy farmers had an income of around €80,000 per farm. In 2008 this number declined to nearly €60,000 per farm. Then the strong price fall came, with the average dairy farm income for 2009 estimated to be negative, around -/- 8,000 per farm (LEI, Informatienet, 2010).

Table 2.3	Family farm income per family working unit (x €1,000)		
	2000-2003	2004-2007	idem 2000-2003=100
BEL	25.8	34.3	133
DAN	14.3	28.6	200
DEU	17.4	27.1	156
FRA	16.8	18.5	110
IRE	24.1	30.6	127
ITA	26.3	38.6	147
LUX	26.5	32.4	122
NED	27.6	35.8	130
UK	27.0	37.0	137
EU-9 a)	22.9	31.4	140

a) Unweighted average.
Source: Own calculations based on FADN.

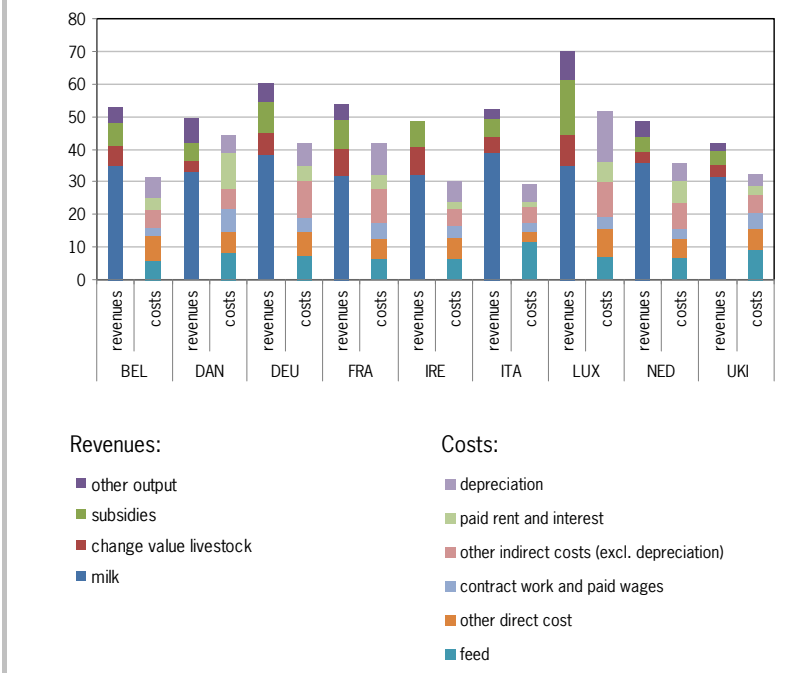
Revenues and costs of production

As Figure 2.3 illustrates, dairy farms in the EU are showing differences with respect to both the level and the composition of revenues and costs. in a different position related to the output and (paid) costs of production. Figure 2.3 illustrates this with FADN data per 100kg of milk for the year 2007. As compared to Germany, France and Ireland, the part of the returns of milk in total returns is high (more than 70%) for countries like Denmark, the Netherlands and the UK. Danish, Dutch and British dairy farms are on average more specialised than dairy farms in most other member states. This implies that dairy farmers in Denmark, the Netherlands and the UK are more heavily dependent on the level of milk prices.

Figure 2.3 also provides information about per unit costs of production (including depreciation), although imputed costs for land or (family) labour are not taken into account. Dairy farmers in Germany and France have on average relatively high total (paid) production costs, although the costs associated with purchased feed are low (Figure 2.3). Dairy farmers in Denmark and the Netherlands have relatively high costs on interest and rent payments, while these (fixed) costs are lower in Ireland and the UK. The relatively high costs on interest and rent payments in the Netherlands may partly reflect the EU's supply management policy since Dutch farmers have, during a period of many years, invested in dairy quota at a high price level. Despite a decrease of the value of the milk

quota in recent years, still about 25% of total assets of dairy farms are associated with milk quota. With the abolishment of the quota system in 2015 their associated balance sheet value will vanish (negative wealth effect).

Figure 2.3 **Revenues and paid costs in € per 100kg of milk (including depreciation)**



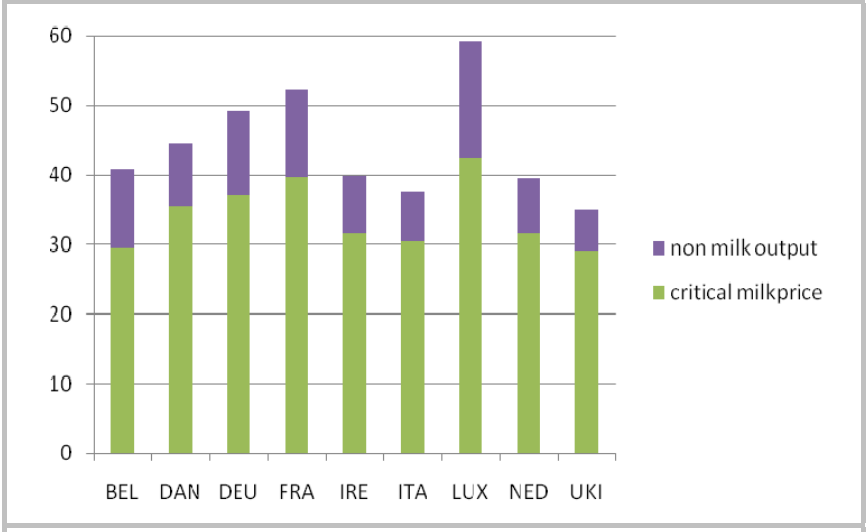
Source: Based on FADN data 2007.

As Figure 2.3 indicates revenues generally exceed paid costs, but this might no longer be the case when full imputed costs for family labour, capital and land are accounted for.

An alternative indicator, which avoids the estimation of imputed remunerations for quasi-fixed production factors and comes closer to actual behaviour, is the so-called critical milk price (Figure 2.4). The critical milk price is equal to the milk price a farmer needs to cover his costs (including depreciation), cover de actual costs of living and ensure continuity of farming. The measure is corrected for the revenues obtained from other outputs (e.g. beef, payments, et

cetera) (see Figure 2.4). The (unweighted) average value of non-milk outputs was €10.06/100kg and varies significantly over member states. The standard of living is approximated by the amount of money farmers actually extract from their farm operation for consumption purposes. The observed amount farmers extracted for consumption purposes varied from €3.05/100kg (Denmark) to €10.74/100kg (France), with the (unweighted) average being €7.87/100kg. For the observed period 2006-2007, the average critical milk price was €34.08 per 100kg of milk. The UK has the lowest critical milk price (€29.14/100kg), with Luxembourg, France and Germany having relatively high critical milk prices. The Netherlands belongs to the group of member states having low critical milk prices (see UK, Italy, Belgium, Ireland). The lower the critical milk price the more competitive dairy farms are.

Figure 2.4 **Total costs of milk and critical milk price in € per 100kg of milk (average 2006 and 2007)**



Source: Own calculations based FADN.

Table 2.4 provides a more detailed and refined analysis for the Netherlands. As Table 2.4 shows, the level of the critical milk price not only varies over member states, but is also very different per farm. Some 10% of the Dutch dairy farmers have a critical price lower than 25 cents per kg, while about 15% of the dairy farmers have a critical milk price higher than 40 cents per kg. A

relatively large group of dairy farms has a critical price around the average of 32.5 cents. Note that larger farms have on average a 10-20% lower critical milk price than smaller farms (scale economies). Besides the main reason of a lower level of per unit production costs on large farms, another reason is that they need less money to cover their accepted consumption level.

Table 2.4 **Dairy farms in the Netherlands classified in line with the level the critical milk price 2002-2007 a)**

	Milk price range (in €ct/kg)	**<25**	**25-30**	**30-35**	**35-40**	**>40**	**Total**
Characteristics							
Number of farms (%)		10	19	35	21	15	100
Number of dairy cows per farm		81	78	68	66	44	67
Investments/100kg milk per year		18.7	14.6	15	13	13.4	14.8
Financial results, in € per 100kg milk							
+	Returns (inclusive subsidies)	41.30	43.10	42.00	42.50	42.70	42.30
	o.w. milk (A)	32.90	33.40	33.60	33.40	33.50	33.40
-	Paid costs and depreciation	25.00	29.50	32.20	35.90	38.30	32.10
	o.w. paid interest	1.60	3.50	4.20	5.20	4.80	4.00
=	Farm Income	16.30	13.50	9.80	6.60	4.40	10.30
-	Private consumption	6.30	6.10	6.80	7.60	14.50	7.50
+	Depreciation	3.50	2.70	3.20	3.10	4.30	3.20
-	Redemption	2.60	4.50	5.00	6.30	5.80	5.00
=	Net cash flow (B)	10.90	5.70	1.10	-4.20	-11.60	1.00
Critical milk price (A-B)		22.00	27.70	32.50	37.60	45.10	32.40

a) Net cash flow exclusive private income and transfers; redemption, exceptional profits and burdens, taxes and private consumption are normalised.
Source: LEI.

Conclusions

From the analysis in this section the following conclusions may be drawn:

- Although the (binding) milk quotas effectively fix milk production at farm level this has not precluded structural adjustment. This is particularly true for member states where quotas were freely tradable, but also when there were significant restrictions on quota trade, structural change did not came to a standstill.
- The net result of structural change is a decline in the total number of dairy farms in all member states considered, significant increases in dairy farm

scale (herd size), and a declining share of small farms in total milk production.

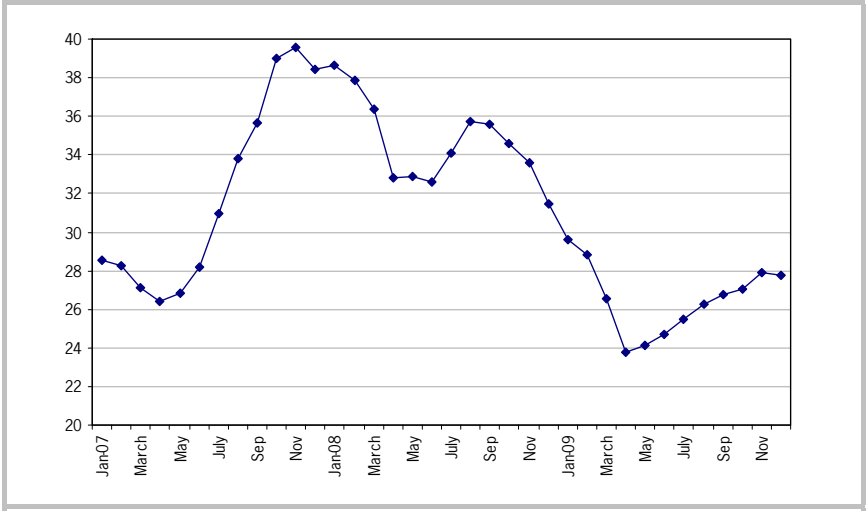
- The farm gate milk prices measured in nominal terms declined slightly in the period 2001-2006 and showed strong fluctuations thereafter.
- Income per (family) working unit in dairy has increased over the period 2000-2007, with the main explanatory factor being farm scale increase. As such structural adjustment within the dairy sector is an important factor to cope with the negative impact declining prices may have on farm income.
- The critical milk price (the milk price a farmer needs to cover all his costs - including depreciation - and to secure continuity of farming) in 2006-2007 for the observed member states was on average €0.34/kg of milk. The critcal milk price not only significantly varies over member states, but even more so over farms within member states.
- For the period 2002-2007 the average critical milk price in the Netherlands was about €0.32/kg of milk; 29% of the farms had a lower critical milk price and 36% had a higher one. About 10% of the Dutch dairy farms had a critical milk price of €0.22/kg of milk. The larger the scale of a dairy farm the lower is its critical milk price, as larger farms tend to have lower costs of production as well as a lower 'cost of living' per unit of milk produced.

3 Recent market developments

Period 2006-2009: extreme price swings

As is shown in Figure 3.1, from April 2007 the average milk price started to increase, peaking in November of the same year. Then, with some ups and downs the milk price declined throughout 2008, achieving its lowest level in April 2009, after which a gradual increase took place. The price fluctuations observed in dairy markets did not stand on their own, but ran parallel to similar price fluctuations in feed markets and other resource markets (metals, energy).

Figure 3.1 **Monthly milk prices in the EU in 2007-2009 (in €ct/kg, at farm level)**



Source: LTO, www.milkprices.nl

Price fluctuations in agricultural markets can come from two sides: supply and demand. Table 3.1 provides a qualitative overview of the major shocks hitting the dairy sector in the period 2006-2009. In general demand shocks are limited in agricultural markets and do not change overnight, with food safety scandals being a prime exemption. Like in previous cases with major agricultural commodity price spikes, the supply shocks seem to have dominated the picture. There was a very significant impact of a drought in New Zealand on the

dairy market. There also were droughts in other parts of the world. Together the observed supply and demand shocks explain to a great extent what happened in late 2006 and early 2007. The impacts on trade might have been exacerbated, though. Measured in relative terms only a small part (about 6%) of the world's dairy production is actually traded, which might make the world market relatively sensitive to shocks because of its residual character. As an example in 2008 world cheese exports declined by 7.8%, which particularly hit the EU, as the world's largest cheese exporter.

Table 3.1 **Shocks to supply and demand and their impact on milk price (2006-2009)**

	2006-2007	2008-2009
Demand	Unexpected high demand in Asia stimulated by high economic growth; Price increase of substitutes (vegetable oils)	Worldwide economic downturn due to economic recession;[1] Melamine scandal in China with negative effects on demand; Increase in intervention stock purchases in EU and US; Abandonment of EU butter and powder disposal programmes
Supply	Drought with significant impact on milk supply in New Zealand; droughts in other places; Negative impact on supply from high feed prices (induced by 3 draughts in 6-year period in Australia and increased demand for ethanol by US); Declining stocks	Increased supply in Brazil, partly as a reaction to the high prices in 2006/07; Increased supply in New Zealand; Slightly reduced supply in EU (several member states under fill quota); Liquidation of dairy cows programme reduced US herd by about 2%
Net impact on price	Milk price increases	Milk price declines

The decomposition provided in Table 3.1 suggests that several shocks (e.g. unanticipated variation in supply due to droughts or economic recession) have an incidental character, whereas others (e.g. demand growth in Asia) are related to fundamentals. Reviewing the factors also suggests that the dairy markets are

[1] Milk prices were already declining before the economic recession got its impact.

increasingly integrated with the rest of the global economy. For example, what happens at energy markets (bioenergy, vegetable oils) is likely to have its impact on the feed market and demand for substitutes, and by that indirectly also on dairy. Moreover, with the EU dairy sector being increasingly linked to the world market (global supply and demand) also its interlinkage to world wide macro economic conditions (e.g. business cycle, exchange rates changes) and shocks increases.

The extent to which factors affecting the world dairy market affect the EU dairy market also depends on the EU's dairy policy. The latter was adjusted in two steps, with the Fishler reform of 2003 (Luxembourg Agreement) reducing the intervention prices for butter and SMP (and the export restitutions linked to this) and also limited the possibilities for intervention, and the Health Check of 2008 adding a gradual annual quota increase in anticipation to quota abandonment in 2014/15. Together these steps reduced the level of the EU's dairy price support system. As regards the price of raw milk, the intervention price adjustments roughly imply a minimum price of about €21 to €22 per 100kg (in 2003 this price was still more than €28/100kg). In particular when the sector experienced the adverse market conditions of 2008/09 full impact of the lowered intervention prices became clear.

Price volatility

As is well-established in the economic literature, in markets characterised by inelastic demand and supply, small changes in supply or demand can cause very large changes in price. While (extreme) price volatility happens occasionally in world commodity markets, until the recent past the EU market was protected from this by the prevailing dairy policy. However, major policy changes (recent CAP reforms, trade liberalisation) have linked the EU dairy product markets more closely to the world market. There is still some protection of the intervention mechanism but it now acts rather as a safety net against extreme downside price risk, whereas in the past it picked up a much larger range of price fluctuations. As is shown by Keane and O'Connor (2009) monthly world butter and SMP prices during the past two decades have been much more volatile than EU prices. Moreover, they show that since 2000 price volatility has increased, also in the EU. Although the dairy sector has unique characteristics, price volatility observed in dairy markets is rather similar to that of a number of other food commodities.

There is a significant difference between the price of raw milk and basic dairy commodities (e.g. SMP, WMP, butter) and the retail prices of final (consumer) products. A main reason for this is that dairy commodities are usually but one of the ingredients of what makes up final products. As a result there is a significant cost wedge from farm to retail/food service, which is also known to have been steadily widening over time. This implies that in relative or percentage-terms the impact of price changes of dairy ingredients on the final product price, even with complete price transmission, will be significantly dampened. Or alternatively, price volatility appears to be far more extreme at the farm and basic commodity market levels of the supply chain, than at more advanced stages (closer to the final consumer). In reality the situation is more complicated because developments such as branding, (long term) contracting, et cetera might have a stabilising impact on the ingredient prices.

Alongside situations of occasional extreme price volatility, there is evidence from the US that also somewhat more recurring cyclical patterns of price and milk production might play a role. The most likely explanation for this is the cobweb cycle theorem, which explains such cyclical patterns in terms of lagged production response to price changes. As long as EU milk production was effectively constrained by the quota, dairy farmers aimed at a fixed target, freeing them from the normal production response to price changes, as typical for free markets.

Ideally price changes and relative price changes signal important information, helping market participants to optimally adjust their behaviour to changed economic conditions (such as relative scarcity). However, extreme price fluctuations might not contribute to the proper functioning of the price mechanism, but rather impede its well-functioning and create negative impacts on the system. For example, extreme price fluctuations may lead to financial problems and threaten the solvency of industries which under normal conditions satisfy long-run viability criteria. Moreover, it may lead to overinvestment (due to misinterpretation of price signals) as well as underinvestment (due to increased uncertainty), which increase the adjustment costs and preclude smooth and timely capacity development. From the study done by Keane and O'Connor (2010, 24) it is mentioned that price fluctuations might conflict with the wish to have stable prices by buyer (like stability for planning, avoiding negative product substitution impacts) and customer (building consumer-client trust and stable marketing relationships) considerations. From the recent past there is some evidence that the high price shock has lead to a fall in demand, in particular for cheese and ingredients (including butter and casein).

Conclusions

Regarding recent market developments the following conclusions can be drawn:

- The dairy market has been subject to several shocks, which were partly related to phenomena associated with the dairy sector itself (impact of weather circumstances), partly with agriculture as a whole (the impact of changing feed prices), and partly with the macro economy (worldwide economic recession).
- Dairy markets are in general characterised by inelastic demand and supply. This implies that small changes in demand and supply (shocks) can cause large changes in price.
- Recent developments as such underscore that the dairy sector is increasingly integrated with the rest of the global economy, in particular with energy markets and currency markets (exchange rate impacts).
- Until recently the EU dairy sector has been effectively protected from price volatility by its dairy policy, which not only supported prices but also stabilised them. Due to the lowered intervention prices, the current policy functions more as a safety net provision against very low prices.
- Price volatility in the EU will increase. Extreme price volatility only occasionally occurs. Stabilisation of prices and avoiding extreme downside as well as upside price swings generates several benefits to stakeholders in the sector by reducing uncertainty, avoiding substitution of dairy products for other products, et cetera.

4 Possible price developments in the years to come

For a comparative overview of recent assessments of the EU dairy policy reform see Jongeneel and Tonini (2009). A general observation made by these modelling studies is that the EU milk prices will first significantly decline as a consequence of the lowering of the intervention prices (Luxembourg Agreement). However, later on the EU milk price starts to increase, due to the increasing internal as well as external demand, while still the EU's supply response is limited because a number of member states still face binding milk quota (cf. Bouamra et al, 2008). In fact, the EU milk price will be at a higher level than the price floor sustained by the intervention prices. Also the need for export subsidies is reduced over time, as studies indicate some convergence between EU and world market prices: EU prices come down and world market prices show a relative increase. These modelling studies are already somewhat dated and do not take into account the most recent market information.

The main source of information with respect to expected future developments are the regular outlook projections as they are made by OECD/FAO, FAPRI and the EU Commission. These usually provide more accurate information with respect to recent market conditions, as well as with respect to variables which modelling studies often take as exogenous and fixed (e.g. exchange rate, business cycle, et cetera). For that reason this chapter mainly relies on an assessment of the projections of these institutions, while using other modelling studies for validation rather than for prediction. It should be noted that most projections of future market developments from modelling studies do not take into account the issue of price variability, but largely base themselves on trends and developments under normalised conditions. To a lesser extent this also holds for the outlook studies. For example, also the latter ignore price volatility and rely on broad economic trends and on extrapolated or assumed changes in agricultural and/or trade policies. Their comparative advantage to other modelling studies is that they use the latest available information and that their projections not only rely on model outcomes, but also are extensively cross-checked with expert information.

Despite the stalemate of the WTO Doha Development Round, further trade liberalisation is a major issue that will alter market conditions for agricultural commodities in the coming decade.[1] Multilateral trade liberalisation enhances the process of reducing the use of agricultural trade distorting measures. Consequently this process will further push down EU price levels of most agricultural commodities, such as milk. To what extent prices will fall depends on EU and external market developments and on the implications of the trade liberalisation agreement.

Recent medium-term projections of international dairy market developments by OECD/FAO (2009), FAPRI (2009) and the EC (2009) show,[2] under the assumption of a reasonable favourable economic growth in the EU and elsewhere in the world, an increasing demand and trade in dairy products, largely in cheese and 'other dairy products than butter and milk powder', such as fresh dairy desert products. Production limits in the EU will be released, but expansion of the milk quota and the abolishment of the quota system in 2015 will not (FAPRI)[3] or just slightly (according to OECD/FAO) increase the overall milk production in the EU, although the EC (2009) seems more optimistic in projecting a 5% increase. As demand for dairy products increases in the EU, its export position will be unchanged (EC, 2009) or decline (OECD/FAO, FAPRI).

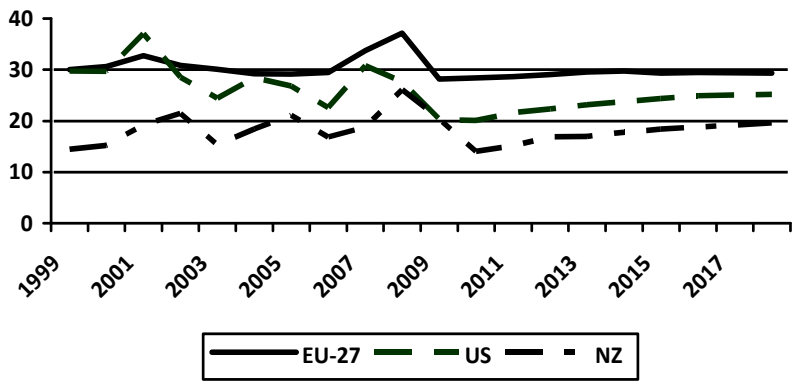
According to the references mentioned, the increase in consumption of dairy products, most prominently in non-OECD countries, will result in higher international prices in the years up to 2018. These projections assume a continuation of the present government support to the sector and existing WTO trade agreement as laid down in the Uruguay Round Agreement on Agriculture. Figure 4.1 shows the projected raw milk prices for the EU and some of its key competitors. Note that OECD/FAO (2009) expects no further impact of the annual EU quota increases after 2009. Note also, that in real terms the projected milk price for the EU will decline.

[1] Despite the suspension of the WTO negotiations in the Doha Round in July 2008, talks on this subject may be expected to resume following the general consensus that trade liberalisation will lead to increase overall economic welfare. Note that as a reaction to the difficulty to reach a new WTO agreement, several countries (notably New Zealand, but also the EU and the US) invest in bilateral trade agreements, which are most likely to be more refined with respect to specific interests than a general WTO agreement could be.

[2] When this report was in press the new FAPRI 2010 projections became available. Unfortunately it was not possible to take these insights fully into account in this analysis.

[3] In their 2010 projection, FAPRI estimates the EU milk production to increase by 3.5% in the period 2010-2018.

Figure 4.1 **Projected price of raw milk for the EU, New Zealand and the US (USD/kg)**



Source: OECD/FAO (2009); WTO agreement impact is own estimate (see further details in text below).

However, in the coming decade further decline in trade distortion measures is most plausible and this process will affect prices at international and subsequently EU markets. One possible scenario of further trade liberalisation could be a WTO agreement according to the July 2008 package (see WTO Committee on Agriculture). For dairy products this package implies a considerable reduction of import protection. Butter and skimmed milk powder are in the 75% up tariff tier and proposed to be reduced by 70%. The import tariff on whole milk powder and cheese (cheddar) should be reduced by 54%.

When these tariff reductions will be implemented, minimal import prices will come closer to internal EU prices. Whether imports will enter the EU at competitive prices, depends on world market price levels. Following world market prices projected by OECD/FAO, import prices for butter and cheese could be, respectively, close to or significantly lower than internal EU prices (see Table 4.1, comparing column 'f' with 'c'). Using FAPRI projections as a base for world market price developments (comparing column 'g' with 'c') indicates a similar outcome. Both projections assume unchanged international trade policies, though. International price levels may rise, most probably, if in WTO context further reduction of import tariffs and export support is agreed. Price levels should be somewhat higher for butter and significantly higher for cheese than presented in Table 4.1 would protection of the EU market for these two dairy products remain to be effective. Extra imports, then, may not be expected for butter under this scenario,

but import competition for cheese may become much more fierce. According to both (OECD/FAO and FAPRI) projections, the average price for cheese in the EU would be much higher than at the world market. Though this may differ between cheese varieties, export to the world market without subsidies must be very difficult according to these projections. This also holds for whole milk powder and butter (comparing column 'd' or 'e' with 'c'). To balance the internal market, the average price for dairy products will have to decline, and consequently the price for milk in the EU.

Table 4.1 **Consequences of lower market protection for EU dairy products due to decrease of import tariffs after the implementation of a WTO agreement based on the WTO Secretariat July 2008 proposal (own calculations)**

Tariff line	Product	Present import tariff (in %)	Import tariff after WTO implementation (in %)	EU price 2018 (euro/100 kg) a)	World market price 2018 (euro/100kg) b)		World market price + new import tariff (= EU import price 2018, euro/100kg)	
					OESO/ FAO	FAPRI	OESO/ FAO	FAPRI
		(a)	(b)	(c)	(d)	(e)	(f)	(g)
04021019	SMP	80.3	20.1	175	180	180	216	216
04022119	WMP	63.9	23.1	201	183	187	225	230
04051019	Butter	89.9	22.5	246	179	160	218	194
04069021	Cheese	52.7	19.0	403	223	219	287	283

a) For butter and SMP: intervention prices (EC, 2009); price for WMP and cheese are market prices based on OECD/FAO, 2009; b) Exchange rate €1 = USD1.15.
Source: OECD/FAO (2009).

How much EU milk price should fall to maintain market positions and subsequently production levels depends on several aspects, such as the relative importance of the non-EU markets to EU producers, international supply and demand developments, and on dairy company strategies.

- First, milk and dairy products produced in the EU are largely consumed locally or inside the trade block, leaving an estimated 10% of production to non-EU markets. In terms of total sales, external markets are thus relatively

small, but yet very important to the EU dairy sector since they significantly contribute to price formation at the domestic (EU) market.

- Second, the OECD/FAO and FAPRI projections used for this study[1] sketch rather favourable demand developments, inducing market opportunities especially outside Europe, and expecting higher international prices. The EU dairy sector may also benefit from these developments by increased sales at more attractive prices in at least some of its main export markets (although the overall export volume is expected to go down by 10% over the period up to 2018 (OECD/FAO, 2009)).
- Third, dairy companies affect prices farmers receive for their milk by the set of products (commodities or differentiated, value added products) the companies produce and the markets they are operating on (EU or world markets, where to export support is necessary). There is a tendency towards an increasing focus on brand development and product innovation in a large part of the EU dairy processing industry (e.g. Everwand, 2006).[2]

Referring to the three aspects just mentioned, but especially due to favourable developments in demand for dairy products outside the EU the eventual effect of a WTO agreement on the European milk price is expected to be relatively limited. This estimate also follows the findings of the EDIM research consortium (reporting on dairy policy simulations in a project funded by the European Community, see the project website www.edim.vitamib.com). They analysed the potential impact of a new WTO agreement by taking the Falconer proposal from autumn 2007 as an approximation of what a new WTO agreement could look

[1] When this report was in press the FAPRI 2010 projections were released. As compared to last year, FAPRI projects the prices for dairy products to be about 30%-40% higher in 2018. First of all this revision of estimates underscores the uncertainty involved in making long term projections, which most likely reflects the uncertainties which are still prevalent with respect to the evolution (in particular the speed of recovery from the recession) of the general macro economy. A second observation is that currently there is a significant difference between the FAPRI projections and those of the OECD/FAO. FAPRI estimates the EU milk price in 2009 to be €26.30/100kg (this was €32.62/100kg) and projects the milk price in 2018 to be €29.68/100kg. This implies a milk price increase of about 13%. The FAPRI 2010 projections imply that the prices for dairy products at the world market come much closer to those of the EU. As such the estimates presented in Table 4.1 might be rather conservative. In contrast, we use an $/€ exchange rate of 1.15 whereas in the latest FAPRI projections an exchange rate of 1.35 (+17%) is used, which provides significantly less protection to EU products.

[2] Building brands takes time and requires efforts. According to dr. Adriaan Krijger (Productschap Zuivel) still less than 20% of Dutch cheese is sold as a branded product (personal remark).

like (Bouamra et al 2009).[1] Their estimates indicate that a Falconer-type WTO agreement could even result in a slight increase in EU milk price, but is unlikely to have big impacts in either a negative or positive direction. OECD/FAO foresees an average milk price of 29.32 cents/kg in 2018. Making a conservative estimate, which also takes into account an estimate of the more recent market changes the impact of a WTO agreement may be assumed to be in the range of a 5-10% lower milk price. The result would be an average milk price of 26-27 cents/kg which comes very close to the average EU milk price in the second half of 2009 (see Figure 3.1) and which is a level that would currently allow only 30% of Dutch dairy farms to remain profitable (see Table 2.4 in Chapter 2).

Conclusions

- Both modelling studies and projections project over time increasing prices due to demand increase.
- Under normal conditions the EU milk price is projected to be above intervention price equivalent milk price, which has been substantially lowered.
- According the projections used in this study EU exports of cheese, butter and whole milk powder seem to be very difficult without export subsidies, which consequently will occur against lower prices.
- Reduction of import tariffs as part of a WTO agreement affects most EU cheese markets. However, diversity of cheese varieties is great which implies many different prices on segmented markets.
- Recent outlooks on dairy markets indicate favourable market developments leading to significant higher international prices. At such (higher) prices import competition will be much less and export opportunities will increase for all EU dairy products.
- As becomes clear when comparing the most recent outlook projections, uncertainty on projections is great, reflecting uncertainty with respect to global macro-economic developments. As such the results from our analysis should be interpreted with caution.

[1] This included the following: export subsidies removed; import tariffs butter -23%, powders -63%, cheese -21%; import quotas for butter and cheese doubled. Gradual implementation staring form 2009 and full implementation in 2014/15. Also the US and other countries make adjustments.

5 Policy scenarios and model simulations for the Dutch dairy farms sector

In this section the impact of a soft landing scenario, additional quota enlargement, a free trade agreement and more stringent environmental legislation on milk quota costs, gross margin and total milk production in the Netherlands are analysed. The analysis provides insight into the differential impacts for various farm types (differentiated with respect to milk yield, dairy cow density per hectare of land, total herdsize).

A brief description of the scenarios and the reference is presented in Table 5.1. The reference scenario is the soft landing scenario as decided on with the Health check. Following other studies (e.g.
Requillart et al., 2008) it is expected that in the Netherlands, even with a soft landing, pressure on the milk quota market will remain relatively high until the abolition of the milk quota system in 2015. A larger increase of the milk quota before 2015, could help to decrease this pressure, and by that also reduce prices of milk quotas. This also contributes to preventing a sharp increase in milk production after 2015. This motivated Scenario S1, which considers an additional quota increase in the period 2005-2015 by 5%. Since under the current market conditions the Netherlands is nearly to only member state which is likely to expand its milk production, the impact on the EU's total milk supply and therewith on the expected market price is estimated to be rather limited (-2%).[1]

Scenarios S2 and S3 concern the period after 2015, with the quotas already being abandoned. S2 considers the impact of a new WTO agreement, which as was discussed in Chapter 4, may lead to an additional price decline (here an estimate of -8% is used). Scenario S3 adds to S2 further strengthening of the environmental restrictions with respect to manure (N and P) application.

[1] Note that a 10% increase in milk supply by the Netherlands will imply an increase in the EU's total milk supply, which is significantly less than 1%.

Table 5.1	Brief description of reference and scenarios	
	2005-2015	**Comment**
Reference	8% increase in milk quota in 2015 compared to 2005 levels, real producer price of milk about constant compared to 2005, development of milk quota prices as Table 5.4	Results with respect of milk production to be interpreted as actual production by the end of 2014/15
S1	13% increase in milk quota in 2015 compared to 2005 levels. Milk price in 2015, -2% compared to reference in 2015	
	2015-2020	
S2	milk quota abolished, new WTO agreement, milk price -8% as compared to reference	Results with respect of agricultural production in general and specially milk production to be interpreted as after 2015, allowing for short to medium term adjustment (2020)
S3	As S2, but manure policies sharpened	
Comment: Assumptions regarding price and quantity adjustments are best estimates, taking into account the recent literature (e.g. Jongeneel and Tonini, 2008 for a brief overview).		

The scenarios are analysed using the Dutch Regionalised Agricultural Model (DRAM) (see Helming, 2005 for further details). DRAM provides a description of agricultural production in the Netherlands at regional level. The model disaggregates the Dutch dairy sector into 8 different farm types, which in the following will be aggregated into 4 subclasses (Table 5.2). Farms are assumed to maximise their gross value added, given their technology and market and technical restrictions. Alongside the dairy sector, it also takes into account other animal production sectors, as well as the arable sector. Interlinkages between sectors and types of dairy farms are included through land markets, milk quota markets and manure markets. For this study it is important to note that prices of purchased agricultural inputs and prices of agricultural outputs are exogenous and should be taken from other models or studies.

Table 5.2	Type of dairy farms included in DRAM			
Type of dairy farm (in this report)	**Type of dairy farm in DRAM**	**Milk production (kg per dairy cow)**	**Dairy cows (heads per hectare)**	**Dairy cows (heads per farm)**
Small, extensive, relative low milk	dairy 1	<7,450	<1.6	<60
quota costs per farm	dairy 3	<7,450	>1.6	<60
Small, intensive, relative high milk	dairy 5	>7,450	<1.6	<60
quota costs per farm	dairy 7	>7,450	>1.6	<60
Large, extensive, relative low milk	dairy 2	<7,450	<1.6	>60
quota costs per farm	dairy 6	>7,450	<1.6	>60
Large, intensive, relative high milk	dairy 4	<7,450	>1.6	>60
quota costs per farm (d4+d8)	dairy 8	>7,450	>1.6	>60

Period 2005-2015

Since DRAM is a comparative static model simulation over period 2005-2015 requires properly taking the autonomous developments as e.g. productivity or yields and efficiency changes, price changes, changes in the availability of land, et cetera until 2015 into account. These exogenous changes are taken from the agricultural outlook study for Dutch agriculture from Silvis et al. (2009), which covers the period till 2020. Compared to Silvis et al (2009) this study includes a different soft landing strategy. The 2015 reference scenario assumes that the milk quota increases with 8% compared to the level of the milk quota in 2005: 2006 +0.5%; 2007 +0.5%; 2008: +2%; 2009:+1%; 2010:+1%; 2011:+1%; 2012+1%; 2013:+1%; 2014:+0%; total: 8%.

The number of farms, gross margin per farm, the milk production per farm and the total milk production per type of farm in 2005 and in 2015 reference scenario are presented in Table 5.3.[1] The number of dairy farms decreases for all types, except dairy farm type 6. Table 5.3 further shows that the share of larger farms in the total number of farms increases from about 42% in 2005 to about 53% in 2015, while the share in total milk production increases from about 63% in 2005 to about 74% in 2015. Developments are especially strong in the group of large and extensive type of dairy farms.

[1] The number of farms per type of dairy farm is not a result from DRAM but is based on extrapolation (see Figure 2.1 in Chapter 2). The number of farms is assumed constant in all scenarios (but their scale is allowed to change).

Gross margins per farm increase from 2005 to 2015 in the reference scenario (Table 5.3). Gross margins are defined as revenues minus variable costs minus costs for purchased milk quota in the period 2005 to 2015. Revenues include the revenue of milk, net sales of young animals, heifers and old cow and the single farm payments. Variable costs include the costs for purchased feed, animal health, energy, plant protection and other variable costs. Costs also include the costs associated with buying additional quota in the period 2005 to 2015. [1]

Table 5.3 shows an increase in the milk production per farm over the period 2005 to 2015. This increase in milk production per farm is different per farm type. It is assumed that due quota enlargement in the period 2005 to 2015 milk production per farm increases yearly with the same percentage. The costs of milk quota per farm in 2015 in the reference scenario are calculated as the purchased amount of milk quota per farm over the period 2005 until 2015 multiplied with the costs per kg of purchased milk quota in 2015. The costs per kg of purchased milk quota in 2015 is a function of the price of milk quota in the different years, the interest rate and the depreciation period (until 2015). The price of milk quota either follows actual observations (2004/05-2008/09), or is assumed to follow a linear pattern of value decrease (see Table 5.4).

Table 5.3 shows that the increase in the milk production per farm over the period 2005 to 2015 ranges from +16% on the small and extensive dairy farms to almost 60% on the large and intensive dairy farms. Accordingly, the costs of milk quota per farm also differ per type of farm.

[1] Costs associated with investments (e.g. equipment, buildings) are not part of the gross margin.

Table 5.3	Development of number of farms, gross margins per farm (real prices), milk production per farm and total milk production per type of dairy farm in the period 2005 to 2015 in the reference scenario							
	Number of farms (* 1,000)		Gross margin (€1,000 per farm)		Milk production per farm (ton)		Total milk production per type (1,000 ton)	
	2005	2015	2005	2015	2005	2015	2005	2015
Small, extensive, relative low milk quota costs per farm	5,236	2,682	59	72 (2) a)	278	322	1,454	864
Small, intensive, relative high milk quota costs per farm	6,868	3,871	79	108 (14) a)	388	583	2,664	2,256
Large, extensive, relative low milk quota costs per farm	4,130	4,889	183	254 (23) a)	824	1,205	3,404	5,890
Large, intensive, relative high milk quota costs per farm	4,582	2,395	163	226 (30) a)	764	1,210	3,502	2,898
Total	20,816	13,837	113	173 (17) a)	530	861	11,024	11,909
a) Milk quota costs per farm in 2015.								

Table 5.4	Estimated prices of milk quotas in the different years in the reference scenario			
Year	**Price of milk quota (€ per kg)**	**Year**	**Price of milk quota (€ per kg)**	
	Ref/S1		**Ref**	**S1**
2004/05	2.13	2009/10	0.66 a)	0.64 a)
2005/06	1.81	2010/11	0.54 a)	0.52 a)
2006/07	0.94	2011/12	0.41 a)	0.40 a)
2007/08	1.01	2012/13	0.29 a)	0.28 a)
2008/09	0.85	2013/14	0.17 a)	0.15 a)
		2014/15	0.05 b)	0.03 b)

a) Assumed; b) Taken from DRAM.

Table 5.5 presents the main results for the reference and the 'additional quota' (S1) scenario. As a result of the increase of the milk quota and the decrease of the milk price as compared to the 2015 reference, DRAM shows that in scenario S1, the price of milk quota in 2014/2015 will be about 35% below the price of milk quota in 2014/15 in the reference scenario (Table 5.4). The development of the price of milk quota from 2011 onwards in scenario S1 is adjusted accordingly. Changes in the prices of milk quotas also affect the costs of milk quotas. Table 5.5 shows that, although the price of milk quotas decreases, the average costs of milk quotas per average farm will increase. This is explained by the increased volume of milk quota trade, especially from the smaller farms to the larger farms. Extra trade is induced by the scenario specific quota expansion, the corresponding decrease of the prices of milk and milk quota and the associated structural change.

Table 5.5 also shows that gross margins increase for larger farms and decreases for the smaller farms, especially the small and extensive farms. The change in gross margin ranges from about +€5,000 for large and intensive farms to about -€2,000 for small and extensive farms.

Table 5.5	Effects of scenario S1 on milk quota costs per farm, gross margins per farm (including quota costs) and total milk production (index) in 2015 as compared to the reference scenario in 2015					
	Milk quota costs (€1,000 per farm)		Gross margin, including costs of milk quota (€1,000 per farm) a)		Total milk production over all farms per category (index)	
	Ref	S1	Ref	S1	Ref	S1
Small, extensive, relative low milk quota costs per farm	2	0	72	70	100	98
Small, intensive, relative high milk quota costs per farm	14	13	108	108	100	103
Large, extensive, relative low milk quota costs per farm	23	24	254	259	100	106
Large, intensive, relative high milk quota costs per farm	30	32	226	229	100	106
Total	17	18	173	175	100	105
a) Gross margin includes the revenue from the Single Farm Payment, which is fixed over scenarios.						

Period 2015-2020

Table 5.6 represents the WTO scenario (S2) and more restrictive environmental policy scenario (S3) respectively. Both scenarios are simulated for the after quota period.

As is shown by Table 5.6, the effect of scenario S2 on total milk production per type of farm are similar but more pronounced than in scenario S1. As compared to S1 in S2 milk production of the smaller farms further decreases, while the milk production of the larger farms further increases. Compared to the 2015 reference total milk production in the Netherlands will increase with about 11% (equivalent with a 19% increase with respect to 2005). Compared to the 2015 reference scenario, scenario S2 shows increased gross margin at large farms, but decreased gross margins at small farms. At small farms the negative effect of the decrease in the milk price is not offset by an increase in milk production; the marginal costs of milk production are relatively high at small farms. Larger farms have lower marginal costs and are better able to gain from milk quota abolition by increasing milk production. The gross margin of small and ex-

tensive farms decreases with about 35% while the gross margin of the larger and intensive farms increases with about 8%.

Table 5.6 **Effects of scenarios S2 and S3 on gross margins per farm and total milk production (index) as compared to the 2015 reference scenario**

	Gross margin, including costs of milk quota (€1,000 per farm)			Total milk production over all farms per category (index)		
	Ref	**S2**	**S3**	**Ref**	**S2**	**S3**
Small, extensive farms	72	47	46	100	79	77
Small, intensive farms	108	100	97	100	98	95
Large, extensive farms	254	261	257	100	116	114
Large, intensive farms	226	244	236	100	120	116
Total	173	171	168	100	111	109

Scenario S3 is in line with the Fourth Dutch Action Plan concerning the Nitrate Directive (LNV, 2009), implying the maximum application of phosphate per hectare of grassland to decrease from 110kg of P_2O_5 (in scenario S2) to 90kg of P_2O_5 per hectare in scenario S3. On arable land the maximum application of phosphate per crop per hectare decreases from 95kg of P_2O_5 in scenario S2 to 60kg of P_2O_5 per crop per hectare in scenario S3. As compared to S2 in S3 gross margin decreases with about €1,000 on small and extensive dairy farms to about €8,000 on the relatively large and intensive farms due to increased transport cost associated with disposal of surplus manure. The effects of the extra costs of manure transport on total milk supply is limited to about 2 to 3% depending on the type of dairy farm. The increased costs to transport manure from the farm also affects other livestock sectors. This is especially the case for the number of fattening pigs and sows. At national level the number of fattening pigs decreases with about 6.5% while the number of sows decreases with about 4%.

Conclusions

From the previous analysis the following conclusions can be drawn:

- The model simulations confirm the observation made in Chapter 2 that the negative impact on the profitability per kilogram of milk associated with the recent reforms of the EU's dairy policy will be compensated for by the con-

tinuing structural change (increase in farm scale lowers costs of production per unit of milk);
- The simulations with DRAM show that in case of an extra increase in milk quota in the period before 2015 (S1), gross margins will be affected in a limited way. For small and extensive farms the gross margin per farm declines with €2,000, while for large intensive farms it increases by about €5,000;
- After quota will be abolished in 2015, it is expected that milk production will further expand in the Netherlands by about 11 percent. Thereby it is taken into account that a new WTO agreement may lead to an 8% further milk price decline;
- A considered more strict environmental legislation might curb this expansion effect, but only slightly.

6 Transitional policies: ways to quota abolition

In previous chapters some consequences of quota removal in 2015 and the soft landing strategy for the intermediate period have been shown. Besides the convergence of the EU dairy product prices to world market price levels, it was argued that increased price volatility is expected relative to the years before 2007 when the EU's dairy policy successfully stabilised the price of raw milk.

Recognising the socio-economic impacts of the milk price decline as well as the stronger price fluctuations for the dairy chain and the potentially significant regional impacts of the EU dairy policy reform, it might be useful to consider several alternative ways allowing the sector to adjust smoothly to a new situation without milk quotas. For that reason this section discusses what different policy measures and private sector instruments can play a role in this. Subsequently the following instruments or measures are discussed:

- Gradual price adjustments;
- Adjustments with respect to quota and levies;
- Accompanying policies;
- Public and private measures to address price volatility.

Since in dairy issues as well as measures are often interlinked, the discussion below will also briefly discuss this aspect.

Price adjustments

The full implementation of the Luxembourg Agreement in the period 2004-2008 lead to a gradual decline in institutional prices (butter -25%; SMP -15%). The Health Check intended a gradual phasing out of the milk quota, by enlarging the quota and by that inducing a smooth price decline. The aim is to avoid quantity and price shocks in 2015 when quotas will be abolished. The way to achieve this was by gradually allowing the EU's domestic supply of raw milk to increase by a gradual enlargement of the milk quota. Moreover, restrictions were imposed on the access to intervention (butter). Initially the constrained supply and the favourable market circumstances contributed to prices which were at least for some products (e.g. SMP) higher than the intervention prices (see also text below). As a consequence initially farmers did not experience the full price de-

cline associated with the reductions in intervention prices. When later on market conditions reversed prices still substantially declined and the impact of the lowered intervention prices became visible.

For farmers not only the milk price but also quota prices matter. In the years that quotas are still in place, the price for milk quotas is expected to decrease, both because the time they will expire (and lose their complete value) will advance, and also as a response to the expected milk price decline. In the Netherlands, already in the years 2006-2010 the value of the quota declined by about 60% (e.g. also Table 5.4). Farmers that still invest in quotas in the years up to 2015 may benefit from further declining quota prices but also their returns will be lower. Moreover they will need to match the costs of such an investment with their financing possibilities as well a other investment priorities (such as investment in land, stables, et cetera).

Export subsidies are linked to or derived from the EU's institutional prices. Export subsidies are planned to be abolished in 2013. This implies that from then on this instrument is no longer available for the support of exports.

Quota policy

Three options to adjust quota and levy policies are considered: quota enlargement, quota tradability and reduction of the superlevy.

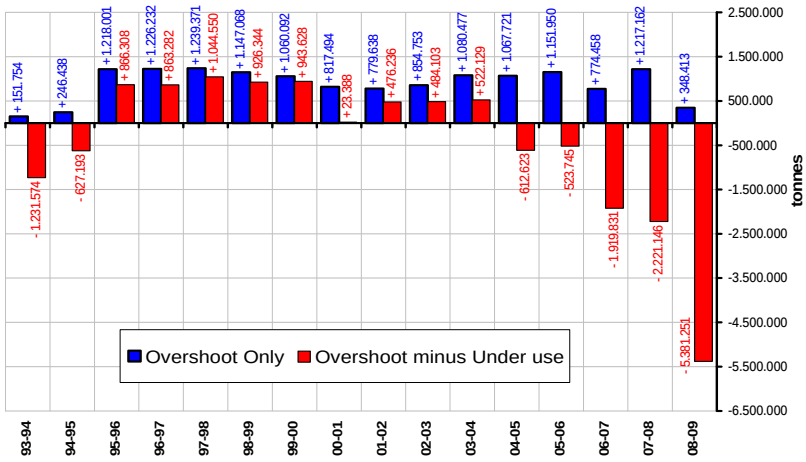
- *Quota enlargement*

  Until 2007 the quota cum price support system has lead to price levels at which until recently milk production levels in nearly all member states have been effectively binding (see Figure 6.1). With declining intervention prices, and direct payments that are decoupled from milk production, milk production is expected to fall in regions with highest production costs as it was already the case in recent years (2007-2009). Although milk quotas were increased in recent years (2006 +0.5%; 2007 +0.5%; 2008 +2.5%; 2009 +1%) the EU's total milk production has not been increased. As such the recently experienced price declines are not a direct consequence of the quota increases but rather due to other adverse market circumstances (see also Chapter 2 for a more detailed discussion).

  The annual quota enlargement of 1% per annum as decided on in the Health Check, gives all member states a proportional quota increase. However, since production conditions vary over member states, the intended gradual phasing out of the milk quota is not achieved. In some countries the quotas are already non-binding now (although they can again become bind-

ing if the milk price recovers from its current low level), whereas in other member states (or regions within member states) quotas are still binding. This implies that whereas in some countries a market lead restructuring can start, in other member states milk output is still constrained, hampering the required structural change. One way to cope with this would be to allow member states with still binding quotas to do frontloading (i.e. move the planned future quota increases to an earlier moment in time). On other occasions the EU has also used this facility to accommodate other special cases.

Figure 6.1 **Quota utilisation in the EU**



Source: EU Commission.

- *Tradability of quotas and balancing of production*

  A more market oriented and efficient milk production in the EU can be reached by allowing free tradability of milk quotas both within and among member states. Restrictions on tradability have already been reduced in recent years, but still quota transfers between member states are not allowed.

  When there are specific policy aims to keep milk production in certain member states or regions within member states, limits on quota tradability or redistribution are understandable. However, since the planned liberalisation of the EU dairy market, will unavoidably lead to a regional redistribution of milk production in the EU, there no longer seems to be a strong reason to

resist a balancing of production.[1] Making quotas internationally tradable could provide regions, where quotas are currently unused, with money to help its restructuring. For example, this could be organised by introducing a buying up scheme, which is also allowed to sell quota to all interested EU member states.[2] Tradability or increased tradability both within and over member states creates additional possibilities for efficient dairy producers, therewith contributing to a more smoothed adjustment. Alternatively quotas could be redistributed administratively, without paying compensations to member states or farmers where production is permanently below the level of quota. Under certain circumstances (i.e. when aggregate demand for quota rights is less than aggregate supply of quota rights) allowing for re-balancing between member states can imply an effective abandonment of the quota system even before its official abolishment in 2015.

- *Lowering the superlevy*
  At present the height of the superlevy (penalty) effectively prevents milk production in excess of allocated quotas. In a transition period considering a reduced levy on excess production might contribute to a more smooth adjustment. On the one hand it would impose an effective upper bound to the quota value, since the quota rent can never exceed the level of the superlevy. Moreover, by allowing very efficient farms to expand their production it provides them an additional option to restructure their business. A sufficiently lowered levy would allow that potentially most efficient farmers may expand their farm at limited costs, notably without investments in quota. A reduction of the levy will contribute to a gradual increase of milk production in the EU, better matching demand developments in the EU and may strengthen the sector's international position. As a transition measure a reduced superlevy could be alternatively interpreted as a co-responsibility levy rather than as a fine: efficient farmers are allowed to expand their production, but pay a compensation which can be used to finance the intervention, storage, or export of surplus milk when necessary.

[1] Although not usual practice, there is another precedent, notably the EU sugar policy case, where quota were allowed to be reallocation over member states in order to facilitate the sector's restructuring to a new market and policy arrangement.

[2] E.g. the sugar sector for an example of such a buying up scheme.

Accompanying policies

Rural development programmes aimed at developing alternative employment outside the farm sector, such as tourism and services, as well as early retirement schemes and farmers' exit programmes are some of the instruments that could be applied to assist the regions where milk production might contract or close down due to the reform of the EU dairy regime. Moreover, they can contribute to encourage and facilitate innovation and sustainable production in the dairy sector and by that improving both its competitiveness and its response to environmental and other requirements of the society. It should be noted that as an element of the Health Check decisions, increased the budget is transferred from pillar 1 tot pillar 2 (modulation) and also additional opportunities are created to make use of so-called Article 68 (previously Article 69) to spend a part (up to 10%) of the funds available for direct payments to specific targets. There are now five purposes for which the funds can be used:

- protecting the environment, improving the quality and marketing of products (as currently permissible under Article 69) or for animal welfare support;
- payments for disadvantages faced by specific sectors (dairy, beef, sheep and goats, and rice) in economically vulnerable or environmentally sensitive areas as well as for economically vulnerable types of farming;
- top-ups to existing entitlements in areas where land abandonment is a threat;
- support for risk assurance in the form of contributions to crop insurance premia; and
- contributions to mutual funds for animal and plant diseases.

To put Article 68 into a budgetary perspective: the resources represented by 10% of the national ceilings for direct payments is equivalent with an amount that varies to between 10% and even more than 100% of Pillar 2 budgets of member states. Article 68 and the flexibility it provides to spend money for different purposes provides a potentially important instrument to tackle negative side-effects of CAP policy reforms in either the dairy or other farm sectors. To illustrate this:

- In October 2009 the EU Agricultural Council has agreed on the distribution of additional €300m for dairy farmers based on the volume of milk quotas per member state. This provides in principle additional budget for the governments to support farmers in creating new economic opportunities and income sources as well as to adapt farms to (new) environmental and other

desires. Because the money has to be paid to individual farmers before the end of June 2010, such a spending will not be met.

- As a response to the economic crisis and the associated dairy market disturbances already in October 2009 the European Commission already allowed member states to pay farmers up to €15,000 in state aid. This incidental measure was taken to stabilise incomes and to overcome cash problems of dairy farmers, but it is also open to farmers in other sectors. In both cases farmers may use the money to adapt their farms to respond better to the new market conditions.

As such both Article 68 and Axis 1 (improving competitiveness of farming and forestry) of the EU's second pillar Rural Development Policy, are also important because they create possibilities for measures aimed at improving competitiveness.

Price fluctuations

As was shown in Chapters 2 and 3 price volatility of dairy products in the EU has increased since 2006. Also when abstaining from occasional extreme price fluctuations, it is expected that price fluctuations will become a more regular pattern in EU dairy markets. This is not only due to the liberalisation of the CAP, which causes the EU market to be increasingly connected to world markets, but also due to globalisation, viz. increased sensitivity to spill-over effects from energy markets, financial markets (including currency markets). There are several mechanisms that can be used to offset price volatility or, more often, to reduce the risks associated with volatility. Partly these measures are in the private realm (dairies, farms), partly in the public realm.

Measures the dairies could take are:

- *Market and sales strategy*
  Branded products generally have the characteristic of being less sensitive to price fluctuations than unbranded ones. As such branding of products could help. The same holds for enlarged promotion spending in key product markets.
- *Portfolio diversification*
  As different product markets differ with respect to their sensitivity to price risk, a natural strategy to reduce the impacts of price volatility is to diversify the product portfolio.

- *Forward contracts*
  Forward contracts are voluntary negotiated agreements between milk suppliers (farmers, processors) and buyers (e.g. milk handlers) which fix a future price. These private contracts are tailor made and are in regular use in the dairy sector, both in business to business and in business to consumer contexts. An example of this tool is the US Dairy Forward Price Program. Experience from this programme shows that it can contribute to substantially reduce price volatility at an implicit insurance premium of about 0.5% of the raw milk price.
- *Futures markets*
  Futures are a well-known market based instrument for managing risk. The basic principle for an actor at this market is to simultaneously take offsetting positions in the cash market and the futures market. By doing that one creates protection against (short to medium term) unfavourable price movements between the period the hedge is made and the final delivery of the hedged product (contract expiration moment). It should be noted that prices themselves are not stabilised, but rather that a margin is fixed. There seems to be a consensus in the literature that futures markets do not add to price variability, but rather reduce variability in cash prices (Purcell and Koontz, 1999, 380).

    Currently no dairy futures market is available in the EU (but in the US there is). In order to well-cover risks, a dairy futures market should have contracts related to the product portfolio. Preferably, a contract should be available for industrial products (e.g. SMP, butter), which are characterised by relative strong price volatility, and for products for consumption (e.g. cheese) risk management. In contrast with forward contracts, future contracts are standardised. Introducing a futures market is not trivial and requires fine tuning of contracts, trading opportunities, attraction of sufficient participants (hedgers as well as speculators) to get a liquid market, and market transparency.

    Alongside being a risk management tool, the futures market also plays a role in the process of (medium term) price discovery. However, future prices will typically be not more accurate predictors of cash prices than other analytical attempts to predict prices (e.g. econometric models) will be. Expected prices are likely to induce supply response changes, and futures markets are not always correctly anticipate the magnitude of this supply response. While contributing to price discovery they also have their limitations.

Moreover, from the recent period there is some evidence that futures are not able to protect against extreme price fluctuations.[1]

- *Mergers*
  Just like with portfolio diversification, company mergers can contribute to diversify risks by enlarging market, client and geographical base.

Measures the dairy farmers could take are:

- *Contracts and futures*
  Farmers is principle have access or could create access to the contract and futures instruments discussed above. Usually this will require intermediaries (which for example pool the milk of several individual farmers). Moreover, since many dairies are cooperatives, the farmer-owners of these firms indirectly profit from all the risk management options open to these processors.
- *Insurance*
  The basic idea of insurance is the pooling of risks. In general insurance is not possible in cases of so-called systematic risk (e.g. risks resulting in may participants in the insurance scheme to make claims at the same moment, with the premiums paid to the pool being insufficient to cover the incurred loss). Since price risks generally affect a broad category of people at the same time, this kind of risk is difficult to insure. An example of an income insurance scheme is Canada's Agri-Stability payment scheme, which provides diary farmers with payments when their margin falls below 70% of a three-year average reference margin. The funding of this programme comes from the private as well as the public sector.
- *Single payments*
  Although the single farm or area payments (direct payments) represent a public policy instrument, they are relevant to discuss in the context of coping with price volatility. They already play an important role to support farmers' income. In The Netherlands the share of the single farm payment in total revenues was about 10% (2005-2007), which implies a much higher share in farm income (about 25%) and this share substantially increased during the dramatic price declines in 2008/09. Since these payments are relatively stable (although declining over time), they contribute to stabilisation as well as the level of farm incomes. Although in principle these payments are de-

[1] This has to do with the so-called base risk. If the futures price and the price in the cash market do not converge when the futures contract expires there is a base risk and the instrument then loses (some) of its value by making the hedge imperfect. During the recent crisis in world food and commodity markets non-convergence was observed in several markets.

coupled from dairy production, they most likely will have an effect when farms are in a transition or survival mode. The tradability of single farm payment entitlements in principle provides dairy farmers with an option to choose an optimal mix of income from direct payments and revenues from market activities.

Policy measures the policy maker could take are:[1]

- *Intervention*
  With the common market organisation for dairy, the EU until recently successfully managed price volatility. Intervention policy establishes a price floor and as such offers protection against down side risks (extremely low prices). As a result of the Luxembourg agreement (2003), the intervention prices were substantially lowered (-15% for SMP and -25% for butter), while also some limits were imposed on the maximum amounts taken in stock. As such this instrument provides a safety net, which becomes effective in case of (extreme) low prices.
- *Private storage supported by the EU*
  Subsidisation of private storage of dairy products is an alternative policy instrument, with a similar market impact as public storage intervention. With such schemes the private sector keeps the primary responsibility for stockholding, such as the risks of changes in prices during the period of storage and the timing of stocking and the release of stocks. Market support under these conditions is a co-responsibility of the sector and the EU. A negative impact of wrongly targeted private storage aid could be that stocks accumulate and start to have a price depressing effect in the market.
- *Buffer stock policy*
  The intervention policy of the recent past has created stocks of dairy products. A buffer stock policy goes one step further in creating stocks to manipulate the market in such a way as to counter extreme fluctuations (release stocks when prices are high, increase stocks when prices are low). It has been proven that a buffer stock policy can be an effective instrument

[1] Only instruments contributing to reducing price or income volatility are mentioned. For example, because on its own the quota instrument increases rather than reduces price volatility it is not included in this list. Import tariffs and export subsidies (fixed or ad valorem!) are also not yet included. Ad valorem tariffs and export subsidies in principle contribute to reducing price volatility at the internal market, but tend to increase volatility at world markets. Combining export subsidies with supply management (quota) might reduce the market disturbance created at third markets, since it limits impacts on exported volume.

to avoid extreme price volatility. Experience has also shown that a practical risk is that stocks are accumulated if the instrument is not only used to manage price fluctuations, but also used and misused as a price support instrument.

- *Anti-cyclical payments*
  The policy maker can try to contribute to stabilise farm incomes by anti-cyclical payments linked to objective market disturbance criteria. An example of such an anti-cyclical payment scheme is the Milk Income Loss Contract-scheme in the US. This programme pays monthly payments to farmers in case their actually received milk price is less than a pre-specified reference or target price. The reference price level might also include 'corrections' for changes in input prices (e.g. feed price). It should be noted that this policy instrument falls into the blue box of the WTO, and is for that reason is not a sustainable policy instrument option.[1] (Blue box measures are only temporary exempted from abandonment.)
- *Market information*
  All the considered arrangements require high quality and timely market information, which is easily accessible. From Keane and O'Connor (2009) it appears that data on stocks, production, prices and markets are often difficult to source and dated when located. This brings them to a plea for a dedicated organisation taking up this role, the more so because this is considered a vital incentive for the development of private market instruments.

Conclusions

In this section several policy instruments are reviewed. First the classical policy instruments are considered and their potential contribution to contribute to a soft landing is assessed. Second, both public and private measures are reviewed with respect to their potential contribution to addressing the negative impacts of price volatility. From this assessment the following conclusions and recommendations are drawn:

- With the 2003 Fishler reform intervention prices for dairy products were substantially lowered, but due to favourable market circumstances this initially did not lead to a strong actual price decline. When market circumstances worsened (2008-2009) the milk price significantly declined to the

[1] According to the Agreement on Agriculture of the Uruguay Round blue box measures are in fact amber box payments related to supply management programmes. The blue box was created to accommodate the USA and the EU and to bring the negotiations to a conclusion. The blue box is viewed as a special temporary exemption category for a limited period.

low intervention price level. As a response the EU Commission offered to option for compensatory direct payments.

- Since the EU's milk production did not actually increase, no direct relationship is observed between the increases in the milk quota during the period 2006-2009 and the decline in the milk price.
- Increasing the degree of tradability of quota both within and over member states would favour the structural adjustments in the dairy sector, which in the end will unavoidably take place after full implementation of the dairy policy reform. This in particular holds for farmers and/or countries which currently face binding quota constraints. Increased tradability of quota would help the dairy farm sector to prepare for quota abolition and further milk price decline.
- The dairy policy reform, including an increasing withdrawal of the public sector requires new public - private arrangements and a redefinition of each others roles and responsibilities. For example, strong public policy interference might hamper the development of private instruments. In contrast, having a public supported independent market information system might contribute to the advancement and well-functioning of private instruments. The big challenge is how to find an adequate balance. Given its mandate (which includes a responsibility for some degree of price stabilisation), there remains a role for the EU Commission to arrange or contribute to a safety net, in particular to cope with extreme downside price and/or income risks.
- The changing policy environment is most likely to induce new developments to cope with price volatility. As regards the public policies, currently the intervention policy provides protection against extremely low price swings. In addition, the single farm payment contributes to the stabilisation of the income of dairy farmers.
- Several options available to the private sector to cope with price volatility were touched upon in this study. However, it is still not clear to what extent they will be a substitute for previous public measures. For example, a futures market can contribute to manage price risks but currently does not exist in the EU, and may not arrive without public and private efforts. In the US, where there is a dairy futures market and there are futures markets for other agricultural commodities, it is known that only a limited number of farmers participate. As another example, whereas contracts can contribute to share risks and stabilise prices in the dairy supply chain, depending on bargaining power structure, contracts may also be used to shift risks to weaker parties.

- An adequate assessment of the impact and potential contribution of public and private measures, and the interaction of private and public measures was beyond the scope of this short study. Also the available literature seems not addressing these issues very well. As such more research on this is needed.

7 Conclusions

The European common market regime for dairy products enters an important stage. Having been in operation since 1984, milk quota will be abolished in 2015. The 2003 Fishler reform implied a substantial lowering of institutional prices (SMP -15%; butter -25%). As part of the 2008 Health Check, the EU Ministers of Agriculture decided to gradually phase out milk quotas by a per annum quota increase of 1.0 percent, proportional over member states and up to 2015. Despite quota enlargement total milk production in the EU has hardly changed, implying that most member states underutilise their quota (Netherlands is an exemption). Recently the raw milk price has substantially declined, largely because of adverse demand conditions.

The motivation for this study was to assess the impacts of the recent EU dairy policy reforms, with a particular, but not exclusive, focus on the Netherlands. In particular the experiences with the soft landing did not met expectations of various stakeholders. The Dutch Ministry of Agriculture, Nature and Food Quality issued this study to analyse what happened and explore policy options that might contribute to an improved soft landing, without questioning the main principles of the EU dairy reform as laid down in the 2003 Luxembourg Agreement and the 2008 Health Check of the CAP. A key finding of this study is that the dairy policy reform requires a strong transition of the sector in all member states. The current implementation of the soft landing puts efficient member states, regions, and/or farmers at a backward position since the quota constraints they still face hamper their structural adjustment process. Policy options which ease this situation, such as allowing frontloading of already planned future quota increases, could contribute to an improved soft landing.

Irrespective of the quota system, structural change in the EU dairy sector was significant over the whole period of its application. As a result the total number of dairy farms substantially declined (with in particular small farms leaving the sector) and farm scale has increased. By increasing their scale of operation, dairy farmers have been able to reduce the costs of production. This helped them to compensate to a large extent for the negative impact on farm income due to declining (nominal and real) prices. The average critical milk price (i.e. the milk price farmers at least need to receive in order to pay their bills, cover their costs of living and to secure continuity of farming) for the group of

member states considered in this study was €0.34/kg of milk. Yet, there are many differences among farms within member states.

According the projections used in this study EU minimum import prices will come closer to EU prices in the years to come. Import protection remains effective for SMP and WMP, but for butter and cheese imports might be able to compete with EU home-based products. Reduction of import tariffs as part of a WTO agreement affects mostly EU cheese markets. However, diversity of cheese varieties is great which implies many different prices on segmented markets.

With export subsidies the EU can achieve exports of SMP and WMP to the world market. However, without export subsidies exports of cheese, butter and whole milk powder will be very difficult. As such the planned abolishment of export subsidies in 2013 is likely to reduce EU export prices, which in turn then might create additional pressure on prices at the domestic market. The latest (2010) outlooks on dairy markets (which came available when this study was in press) indicate significantly higher world market prices for all dairy products, mainly as a consequence of more favourable market developments. At such (higher) prices import competition will be less than anticipated based on 2009 projections and export opportunities may increase for all EU dairy products.

When comparing the differences in projected prices from recent outlooks the uncertainty is striking. This is amongst others due to uncertainty with respect to global macro-economic developments. It emphasises the need to handle the results and conclusions based on this material to be treated with caution.

According to our best estimate, the long run EU milk price (2018) will be about €0.29/kg (without a new WTO agreement) or €0.27/kg (with a new WTO agreement). Both estimates are significantly lower than the average critical milk price level that was observed for the 9 EU member states considered in this study (but substantially higher than the present EU's equivalent intervention price for raw milk of about € 0.21/kg). From our analysis it became clear that when structural adjustment (increasing farm scale) can do its work, a significant part of dairy farms will be able to supply their milk at this price; already about one third of the Dutch dairy farms currently has a critical milk price less or equal than €0.30/kg, while the average critical milk price in Belgium and the UK is presently below this level. Some simulation exercises done in this study indicate that The Netherlands might be able to expand milk production with a further 10% after 2015. A more strict environmental policy might reduce this expansionary effect, but only in a marginal way. Such a strong increase of milk pro-

duction may negatively affect prices in the EU. To prevent this, additional measures are required, such as extra quota expansion before 2015 in countries like the Netherlands where quota remain binding.

The dairy policy reforms imply an increasing withdrawal of the public sector and therewith requires a rebalancing of roles and responsibilities between the private and the public sector. Given its mandate (which includes a responsibility for some degree of price stabilisation), there remains a role for the EU Commission to arrange or contribute to a safety net, in particular to cope with extreme downside price and/or income risks. The current intervention mechanism can be argued to operate as such a 'last resort' safety net provision. Also the single farm payment contributes to stabilise farm income. However, still the sector has to prepare itself to deal with a significantly increased price volatility. An inventory has been made of measures and instruments and their potential role to either managing price risks or reduce volatility. However, an adequate assessment of the impact of the various measures, and the interaction of private and public measures was far beyond the scope of this short study. Also the available literature seems not addressing these issues very well. As such more research on this is recommended.

Another observation is that the current minimum price provision (as supported by the intervention prices) supports prices at a rather low level. When due to adverse market conditions the milk price will approach this level, in the Netherlands currently about 90% of the dairy farms would no longer be able to pay their bills. This implies that if such negative shocks occur to the sector, this will generate political pressure to provide additional assistance and the risk that ad hoc solutions will be introduced. Rather than doing this, providing an extended safety net provision might be a better response. Moreover, since structural change plays such an important role for the sector to adjust to the new policy and market environment, accompanying policies (Article 68 and Axis I of the second pillar of the CAP) should be used in such a way as to facilitate this transition process and contribute to the sector's long run competitiveness.

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