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The dairy industry in a fast-growing European Union: policies and strategies

The European dairy sector is faced with a period of significant changes. Besides the European Union (EU) enlargement to new Member States, the Luxembourg reform of June 2003 and the WTO international negotiations, more and more countries are in favour of a removal of the milk quota system implemented in 1984. The objective of our research is to explore the impact of potential reforms of the European dairy policy in this new context. In particular, we study the effect of scenarios with gradual and significant increases in European milk quotas on the milk and dairy markets as well as on producers' income and on the economic welfare of the EU.

Modelling tools

Modelling tool for dairy policy reforms

The analysis of dairy policy scenarios relies on an analysis tool developed within the European research project (EDIM).¹ It is a partial equilibrium model of the European dairy chain (EU 25), which is based on precise modelling of the whole chain (milk production, milk processing into 14 end products, demand for processed food products) for each of the European countries (14 countries of the EU-15, the 3 main milk producers of the EU-10 and an aggregate of 7 other countries of the EU-10). Oceania, as a main EU competitor on the world dairy market, is also taken into account. The demand from the rest of the world comes from 4 different import areas (Asia, Africa and Middle-East, America, and the rest of the world). One original feature of this model is to take into account precisely the equilibrium of the two main components of milk: fat and proteins. Last, the model is based on the modelling of all the economic policy instruments used in this sector: domestic policy (intervention prices, milk quotas, direct aid, and consumption support) or trade policy (export subsidies, import taxes, tariff quotas).

Milk supply modelling

The milk supply functions were derived from a dynamic model of beef meat and milk supply developed at Wageningen University (see in particular Burell and Jongeneel (2001)). This model allows us to take into account the substitutabilities and complementarities between meat and milk production and to distinguish between short-term and medium-term production adjustments taking into account livestock variation.

Reform simulation

Functioning and assumptions

The model is used as a simulation tool for the dairy chain over the 2003/2004 to 2014/2015 period. From one year to the next, a number of changes are taken into account:

- Change in the level of policy instrument (gradual reform).
- Change in demand over time
- Adjustment of the milk supply, due on the one hand to technical progress and on the other hand to a dynamic effect (adjustment of the herd of cows, taking into account the price the previous year).

The simulation results particularly rely on an assumption of instantaneous market adjustment to economic policy changes. Moreover, we also suppose that the EU subsidies (consumption aid as well as export aid) are adjusted in such a way that butter and skimmed milk powder (SMP) market prices are the closest possible to the intervention prices at equilibrium. In other terms, when the powder (or butter) price is higher than the intervention price, the price supports to these products are lowered. The process stops when supports are null. Thus, when the powder (or butter) price is higher than the intervention price, it means that this product no longer receives price support (it is what we note at present on the powder market).

Description of the scenarios

The scenarios are defined over the 2003/2004 - 2014/2015 period. The benchmark scenario corresponds to milk policy such as it was defined by the Luxembourg reform (25% drop in intervention prices of butter and 15% SMP, gradual increase in milk quotas and introduction of direct decoupled aid). Moreover, in the perspective of a new WTO agreement, the scenario integrates trade policy assumptions. This possible agreement, progressively implemented over a 5-year period from 2008/2009, provides for (i) a complete withdrawal of export subsidies and (ii) a reduction in import duties based on the Mandelson proposal of November 2005.

¹ The development of this analysis tool would not have been possible without a long-lasting collaboration with the CNIEL (Centre National Interprofessionnel de l'Industrie laitière). The results presented here only bind the authors of this note.

We simulate 2 scenarios of gradual increases in milk quotas. The first scenario (denoted Q1) supposes a 1% increase in quotas per year, in each EU country, over the 2008/2009 to the 2014/2015 period. At the end of the period, the potential increase in production is 7%. Over the same period, the second scenario (denoted Q2) supposes a 2% quota increase per year, leading to a potential 14% increase in production at the end of the period.

The Luxembourg reform and WTO agreement:

Main results

Impact on the milk price

The Luxembourg reform has a significant effect on the European milk price (figure 1). At the beginning of the period, the milk price drops until 2006/2007. Then it remains stable until 2008/2009. Finally, it increases over the last period. During the first period, the drop in the milk price is due to the gradual fall in intervention prices provided by the Luxembourg reform. After 2006-2007, the reform has fewer effects because during this period the positive effect of the rising demand on the milk price compensates for the negative effect of the increase in milk quotas. Over the last period, in the EU the farm-gate milk price increases under the effect of the positive trend in demand (globally, the aggregated demand for fat and protein respectively rises by 0.2% and 0.5% per year). Moreover, inside the EU the WTO agreement simulated here will have a slight positive impact on milk prices. This agreement has three main effects:

- The reduction in import tariffs in the importing areas of the rest of the world has a positive impact on the EU milk price because its effect is to boost the demand for dairy products in the rest of the world.
- The reduction in EU import tariffs has a negative or null impact on domestic prices.
- The withdrawal of export subsidies has a negative impact on domestic prices.

According to our results, the sum of these three effects is positive because, on the one hand, after a new WTO agreement, the rise in EU imports is marginal, and on the other hand the impact of the withdrawal of export subsidies is low because, following the Luxembourg reform, very few export subsidies are necessary to balance out the markets. Indeed, we should not forget that milk production is levelled off by quotas which virtually do not increase while the domestic demand follows a positive trend. Therefore, fewer and fewer products are available for export. Lastly, for a certain number of products (products rich in protein), the EU becomes competitive on world markets (which is already the case on the powder markets).

Impact on dairy markets

The Luxembourg reform combined with a new WTO agreement brings about a fall in the prices of almost all the dairy products with the exception of skimmed milk powder and semi-hard cheeses. Productions are affected in a different way. As milk production is barely modified, the rise in production of one milk product cannot be achieved without the decrease in production of another dairy product. Taken as a whole, European production of dairy products is more and more oriented towards cheese production and fresh products to the detriment of industrial products (table 1).

At the end of the simulation period, the main effects to remember are as follows:

- Farm-gate price drops by 7% in relation to 2003.
- Butter price drops significantly (it is at the intervention price level) while the SMP price is higher than its initial level and therefore is higher than the intervention price. This difference in price evolution is linked to a much stronger trend in demand for protein than for fat. The EU is not competitive on the international butter market.
- As a whole, EU exports go down (with the exception of cheese). The global export drop is the consequence of a rise in dairy product demand in the EU, while production increases but only marginally due to milk quotas.
- Production turns towards value-added products intended for the domestic market and production of so-called industrial products decreases.
- EU prices “converge” towards world prices.

Quota Increase

Main results

In this section we present the results of two scenarios of quota increases (Q1 and Q2). It is to be noted that in scenario Q2, at the end of the simulation period quota rents are almost null (so, quotas do not limit production). Therefore at that date, in this scenario, the equilibrium of markets is very close to the one we would observe if there were no quota.

Impact on milk markets and dairy products

Table 2 shows the results at the end of the simulation period. They are expressed in indices in relation to the situation observed at the same date in the benchmark scenario. Therefore, we measure the change linked to the implementation of quotas.

On the milk market, the quota rise leads to:

- A significant drop in the milk price. Globally, a 1% rise of effective production leads to a 3% drop in the milk price.
- A rise in milk production that is lower than the potential increase permitted by quotas.
- In many countries, even in scenario Q1, quotas are no longer restrictive.
- Production in Q2 is only higher than that of Q1 by 1.4% (while it potentially could be 7%).

For processed products, the rise in milk quotas leads to:

- A greater fall in the butter price than in SMP. Actually, due to the SMP export potentials, the demand is less elastic for butter than for the SMP.
- An increase in production of all dairy products, as well as a significant rise in exports for all products.
- In scenario Q1, butter exports do not rise (they increase in Q2 to remain at very low absolute levels). The need to use fat produced on the domestic market explains a larger price decrease.
- Production of fresh products increases less than other products.

Sensitivity analysis of results

Previous surveys bring to the fore the fact that the assumption of the trend of demand for milk and dairy products prices is important. All things being equal, a 1% increase in demand

would lead to a 3% rise in the milk price. Therefore, it is important to analyse the sensitivity of the results to a variation in demand trends. In addition to the central assumption, we consider two assumptions to test the sensitivity of our results to trends:

- An assumption of low demand, which consists in considering that there is no demand change for dairy products as a whole in the EU-15 with the exception of butter, which has a negative trend (we keep the assumptions of a rise in demand in the EU-10 and in the importing areas),
- A high assumption, which consists in doubling the evolution trends in dairy products as a whole (in the EU-15) with the exception of the butter.

In the same way, we test the robustness of our results in relation to the assumptions of production costs. Besides the standard assumption (which was based on the measurement of medium-run marginal production cost), we consider a high assumption for production costs. This is why we keep the assessments of marginal production costs over the long run, which according to the country, are 20 to 30% higher than the previous ones.

For a given demand level, the increase in production costs leads to a significant fall in production and to a rise in the equilibrium price of milk (table 3). The increase in cost also implies a fall in the average quota rent, which in any case is low. For a given cost level, a drop in demand leads to a fall in the milk price, in quota rent and in production. This last adjustment allows the price decrease to be limited.

On the whole, price and production are sensitive to assumptions on costs and demand, with price being more sensitive than production.

Impact on surpluses and welfare

The increase in milk quotas has the effect of increasing production and consequently of reducing the milk price at the farm-gate. This fall in price is beneficial to consumers but is to the detriment of the producers' income, which is largely affected and loses more than 3 billion euros (Q1) at the end of the period compared with a situation of status quo (table 4). As a whole, the reform has a positive impact on welfare, measured as the sum of the variation in the various agents' surpluses.

A few concluding remarks

Without summarizing all the results presented here, it is important to emphasize the following elements:

- After a time when the milk price falls in relation to the Luxembourg reform, the effect of the gradual rise in demand leads to a progressive increase in milk prices after 2007/2008.

- The progressive increase in quotas has an important price effect. It quite rapidly leads to a situation close to that which would prevail in the absence of quota.

- We may consider that in the absence of quota, European production would be higher than present production (around 5%).

- An increase in production affects the fat price more than the protein price. The price of farm-gate milk strongly depends on the evolution of demand.

- An increase in production has an important negative effect on the producers' income because the price effect is large and the volume effect (increase in production) does not compensate for it.

We must keep in mind the limits of the tool, which in particular depends on the assumption of instantaneous price adjustment, quantities and processing capacities. Therefore, the results instead express a trend. Furthermore, the model does not take into account the more general equilibrium between the milk activity and other farming activities.

Zohra Bouamra-Mechemache et Vincent Réquillart, Toulouse School of Economics
(UMR 1291 – GREMAQ CNRS – INRA - Univ Toulouse 1), **France**
Zohra.Bouamra@toulouse.inra.fr; Vincent.Requillart@toulouse.inra.fr

For further information

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Frame: The modelling of milk supply

The milk supply model is designed among other things through marginal production costs (the costs of the last unit of produced milk). Taking the existence of milk quotas into account, this marginal cost is not equal to the milk sale price (in the absence of quota, a rational producer levels out his marginal cost to the market cost). The difference between the price and the marginal cost is called quota rent.

Different marginal costs were assessed for this analysis. They differ by the expenditure items they integrate (see Moro et al, (2005) and Cathagne et al. (2005)). Medium-term marginal costs integrate all the variable inputs, the milk herd cost as well as the investment in machines and buildings and hired workforce. Long-term marginal costs include land cost as well. According to the country, the assessed marginal costs vary between 0.16 €/kg and 0.24 €/kg in the long run.

Furthermore, the elasticity of prices for milk supply varies between 0.17 and 0.29 according to the country.

Echelle de la figure 1: ordonnées non lisible

Figure 1: Farm-gate milk prices

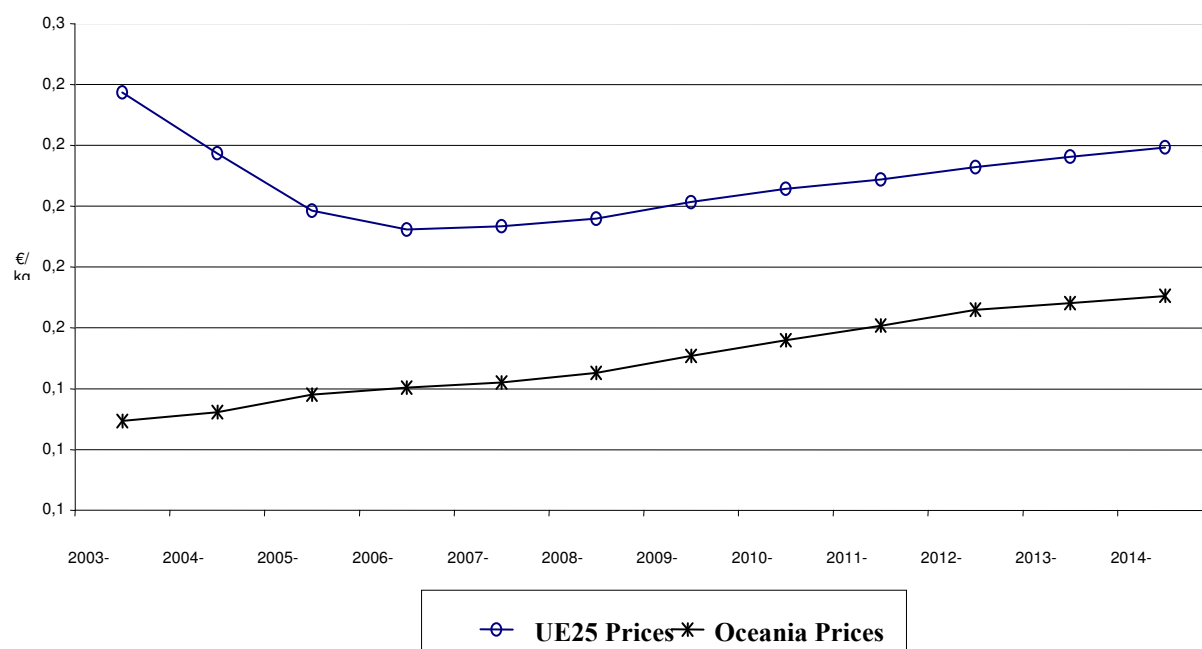


Table 1: Impact of the Luxembourg reform on dairy markets, 2014-15. Results in index, index 100 = value in 2003 -04.

	Price	Production	Export
Farm-gate milk	93.5	102.3	
Butter	76.5	88.7	7.2
Skimmed milk powder	105.9	79.5	63.5
Fat powders	94.0	95.0	84.0
Cheese	101.0	114.5	147.9

In the case of cheeses, the indicated price index is that of semi-hard cheeses.

Table 2: Impact of dairy quota increase, 2014-15. Results in index, index 100= value in 2014-15 in the benchmark scenario.

	Price		Production		Export	
	Q1	Q2	Q1	Q2	Q1	Q2
Farm-gate milk	85.5	81.7	104.7	106.1		
Butter	80.7	76.5	106.0	108.5	100	300.5
Skimmed milk powder	92.6	89.9	110.0	115.6	129.9	150.1
Fat	92.3	89.9	136.2	143.1	168.5	181.2
Semi-hard cheeses	91.9	89.6	104.7	107.2	126.9	143.0

Table3: Scenario with increase in quotas (Q1): Sensitivity of results with alternative assumptions on the demand trend and marginal production costs. Value in 2014 - 15.

Demand	Milk prices (€/kg)		Quota Rent(€/kg)		Production (Mt)	
	St cost	Cost +	St cost	Cost +	St cost	Cost +
Standard	0.222	0.249	0.020	0.004	139.2	134.7
Low	0.206	0.235	0.011	0.001	137.0	132.2
High	0.240	0.264	0.032	0.007	141.0	137.0

St costs: Standard Assumption production costs, Cost +: high production costs assumption, 20 to 30% higher.