

Aus dem Institut für Marktanalyse und Agrarhandelspolitik

Petra Salamon

**Proposal for a thematic session at the EAAE Congress
"Exploring Diversity in the European Agri-Food System"
at Zaragoza 28-31 August 2002 :**

**Theme: Modelling the phasing out of milk quotas –
methodological problems and solutions**

Paper at X Congress of the European Association of Agricultural Economists, Zaragoza (Spain) 28-31 August 2002

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Proposal for a Thematic session at the EAAE Congress „Exploring diversity in the European Agri-Food System“ at Zaragoza 28-31 August 2002

Theme:

**“Modelling the Phasing Out of Milk Quotas –
Methodological Problems and Solutions”**

Overall in Europe, the dairy sector is an essential component of the agri-food system. Although in most countries milk production is regulated by a quota scheme and within the EU-15 even by a common milk market regime, dairy production and processing as well as consumption and trade reflect diverse regional structures. Furthermore, budget constraints, policy reforms (Agenda 2000), EU enlargement, ongoing trade liberalisation, technical advances, and powerful processing enterprises induce strong competition and structural adjustments. Against this background, new discussions on reforming EU milk policy have taken place and demands were made to repeal the milk quota system altogether.

The last year saw increasing research activity on the effects of an eventual abolition of the EU milk quota regime. Several studies by national and international groups comparing scenarios with and without the milk quota have been made (e.g. in BENJAMIN et al., 1999; BOUAMRA-MECHEMACHE et al., 2001; COLMAN (EDIT.), 2002; KLEINHANSS et al., 2001) and the results received considerable attention in agricultural policy discussion (conferences on this issue took place at Kansas City, USA (CARD), October 1999, Paris, France (INRA), October 2001; Brussels, Belgium (CEPS-DEFRA), April 2002). However, while the economic results were often published and have been presented to various audiences, the methods applied have seldom gained similar publicity. The thematic session now proposed is intended to close this gap.

The primary objective of the session would be to discuss the methods applied in quota removal research. Methodological problems and solutions found as well as the shortcomings that may still exist will be highlighted. In detail, the following points will be tackled:

1. theoretical framework
2. general modelling approach (AGE-models, PE-models, econometric models, programming models) with special reference to
3. milk supply (production function, production costs, representation of underlying decision problems),
4. milk usage (processing, domestic human consumption, foreign trade, subsidised disposal);
5. implementation of the milk quotas, quota trade, quota rents and direct payments; formation and transmission of prices;
6. agents included as well as links established between enterprises, markets and regions;
7. exploration of data bases with reference to regional and sectoral disaggregation;

The following schedule is planned:

- A short synoptical view of the models/methods applied and of the links established between markets, regions and farms including research not presented at this session but elsewhere (10 min., to be presented by the organiser of the session)
- Five presentations of individual research groups on their modelling approaches, focussing on highlights (10 min. each):
 - 1.a) "Dairy Policy without Quota: scenarios for the Netherlands and the European Union" by
J. F. M Helming, F. W. van Tongeren
 - 1.b) "Endogenous adjusted Output Quotas – The Abolishment of the Raw Milk Quota in the European Union" by
M. Lips., P. Rieder

- due to similarities in the chosen methodological approach, contributions 1.a and 1.b will be presented together.

 - 2) "Phasing out Milk Quotas in the EU" by
D. Colman, D. Harvey, A. Bailey, V. Requillart, Z. B. Mechemache, M. Banse, F. Noelle, G. Rapsomanikis and E. Oliver
 - 3) "The INRA-Wageningen simulation system for the EU dairy sector" by
Z. Bouamra, A. Burrell, H. Guyomard, R. Jongeneel, V. Réquillart
 - 4) "Experiences of using a quadratic programming model to simulate removal of milk quotas" by
T. Jansson
 - 5) "How to Phase Out Milk Quotas - Possible Impacts on European and German Agriculture" by
W. Kleinhanss, D. Manegold, M. Bertelsmeier, E. Deeken, E. Giffhorn, P. Jägersberg, F. Offermann, B. Osterburg, P. Salamon
- Discussion (25 min.)
- Summary and conclusion of main findings (5 min.)

The expected results are manifold. First of all, innovative modelling approaches will be shared and disseminated. Similarities and differences in approaches as well as impacts on results will be discussed. Existing shortcomings and gaps can be unveiled and innovative solutions compiled. Future research activities might be identified. Furthermore, our proposal more generally aims at creating some kind of network which might connect European researchers as an open and informal group of modellers working in the fields of agricultural policy analysis.

We have made provisions for publishing not only the papers of the contributions selected for oral presentation but also a few more concerning milk quota abolition. The proceedings volume is intended to give a broad overview of approaches presently used in the impact analysis of phasing out EU milk quotas.

Literature:

BENJAMIN C.; GOHIN A.; GUYOMARD H. (1999): The future of European Union dairy policy. Canadian Journal of Agricultural Economics, 47, pp 91-101.

BOUAMRA-MECHEMACHE, Z.; DARTIGUES, K.; RÉQUILLART V. (2001): Réforme de la politique laitière de 'Union Européenne: analyse de scénarios. INRA, Toulouse.

COLMAN, D. (edit.) (2002): Phasing out Milk Quotas in the EU. Centre for Agricultural, Food and Resource Economics – University of Manchester. (main report)

KLEINHANSS, W.; MANEGOLD, D.; BERTELSMEIER, M.; DEEKEN, E.; GIFFHORN, E.; JÄGERSBERG, P.; OFFERMANN, F.; OSTERBURG B.; SALAMON P. (2001): Phasing out Milk Quotas – Possible Impacts on German Agriculture. FAL, Braunschweig. (BAL-Arbeitsbericht 01/2002)

Individual Contributions

Dairy policy without quota: Scenarios for the Netherlands and the European Union

Abstract

In a recent study on behalf of the Netherlands Ministry of Agriculture, Nature Management and Fisheries two models have been used in tandem to assess alternative scenarios for dairy policy reform. The Dutch Regionalised Agricultural Model (DRAM) is used to provide insights for the Netherlands, with a lot of emphasis on the interaction between dairy policy and environmental policies. A modified version of the global general equilibrium model GTAP was used for an assessment at the EU aggregate level. The multi-region model allows us to put the analysis in the context of the new WTO round.

The paper focuses on the technical modelling aspects. The alternative policy scenarios serve as background to illustrate the technical implementation. The policy options include two successive 15% intervention price cuts in 2003 and 2006, compensated by a premium of 24.8 euro per tonne for each step. This adds up to 49.6 euro per tonne of milk in total. The increase in milk quotas in the same period follows the Agenda 2000 reform resulting in a 2.4% increase at EU level by the year 2008 and a 1.5% increase for the Netherlands. Complete abolition of the milk quota regime is also considered.

The Netherlands: Dutch Regionalised Agricultural Model, DRAM

DRAM is a regionalised comparative static partial equilibrium model of the Dutch agricultural sector. The model describes the allocation of agricultural production in the Netherlands over the regions. This allocation is based on agricultural activities (dairy cattle, pigs, cereals et cetera), not on the type of farm. DRAM generates an optimal allocation of agricultural production within the limits of a number of technical restrictions. Producers are assumed to maximise net revenue (revenues minus variable costs).

Two important and related restraints in the Netherlands for an increase in milk production are the area of agricultural land and the environmental policy, especially with regard to manure. The minerals policy to tackle the manure surplus will be tightened, in the sense that the mineral losses allowed (the difference between input and output of minerals in kilograms per hectare of agricultural land) will be lowered progressively until 2003. A levy is charged for losses that exceed the loss standards. The minerals policy is complemented by the introduction in 2002 of a 'manure disposal contracts system'. Under the contracts system farmers must plan manure disposal before it is produced, either on their own land (provided the mineral loss standards are not exceeded) or by 'selling' it to farmers with a manure shortage, mostly arable farmers. Arable farmers receive a fairly high price for the manure they 'buy' from farmers with a surplus.

Besides the base line, five different scenarios have been run with DRAM to assess the effects over the years (2003, 2006, 2008). The scenarios refer to the cut in milk prices on the one hand and to the tightened manure policy on the other hand. The 2008 scenario includes the abolition of the milk quota system in 2008.

EU level: The amended GTAP model

The GTAP multi-region, multi-sector general equilibrium model is a general and flexible framework, which does not attempt to capture all sectoral detail but is flexible enough to allow elaborations in the face of specific dairy policy questions. A number of specific additions to the standard GTAP model are made in order to tailor it to the analysis of the EU's dairy policy. In particular we introduce a quota system in the milk sector, technically implemented as a complementary problem that allows for endogenous regime switches and endogenous quota rents. We also introduce explicit intervention prices and endogenous export subsidies in the dairy sector. The paper discusses the technical aspects of dairy policy modelling in the GTAP general equilibrium framework. Particular emphasis is given to the sensitivity of results with respect to estimates of base period quota rents.

The simulation results with the amended GTAP model show that the proposed reduction in dairy intervention prices by 30%, with compensation, is more than sufficient to constrain milk output for the EU15 as a whole until 2008. The price reductions are of such a substantial magnitude that they erode the rents associated with milk quotas.

Simulation of a new WTO agreement in 2006 shows that a reduction of the intervention price with 17% is sufficient to conform to the new WTO commitments; the production growth within the EU in this simulation is limited to 1.5%. The WTO constraints also limit the negative effect that growth of EU exports might have on the world market, as the increase in export volume is only possible if internal prices are lowered. The effect on the world market price is limited.

Endogenous adjusted Output Quotas – The Abolishment of the Raw Milk Quota in the European Union

Theme: Analyzing the impacts of an abolition of raw milk quotas with the general equilibrium model GTAP

Abstract (method)

We analyze the impacts of an abolition of the raw milk quota in the European Union on a country level using the general equilibrium model of the **Global Trade Analysis Project (GTAP)**. The worldwide GTAP data base includes all member countries of the European Union. Based on the GTAP Technical Paper by Bach and Pearson we introduce the milk quota into the GTAP model. So the model is able to change from a binding to a non-binding status and vice versa. Both the supplied quantity and the quota rent are adjusted endogenously. Since the quota rent is interpreted as additional earnings of the factors used no change of the GTAP data base is required. Several modifications of the GTAP model and two exogenous coefficients are necessary. Considering uncertain values of one of the coefficients, systematic sensitivity analysis is applied.

Results

The abolishment of the raw milk quota in the European Union would lead to a remarkable decrease in raw milk prices in most member countries. The raw milk production increases in Denmark, Ireland, Luxembourg and the Netherlands while it declines in Greece and Portugal. In all other member countries the raw milk production changes slightly.

Phasing out Milk Quotas in the EU

Summary

1. The full liberalisation of the EU dairy regime would, it is estimated, lead to modest expansion in EU15 milk production and processing as a whole, and in nearly all member states.
2. Reform of EU dairy policy to eliminate quotas through elimination of market protection and price support is economically worthwhile. It is estimated that the overall net welfare benefit of removing both price supports and milk marketing quotas would generate annual benefits of €2.27billion by 2010.
3. Most of the benefit from eliminating the present policy arises through more efficient pricing and marketing of dairy products, rather than from substantial changes in quantities produced. In fact, without the policy, EU dairy production is estimated here to be only 3-8% above the Agenda 2000 quota restricted level. This is estimated to be so despite projected substantial reductions in the average producer price of milk, which reflect smaller proportional declines in dairy product prices.
4. Elimination of the present policy would clearly damage the owners of existing dairy farm assets, the values of which would decline substantially to allow the dairy sector to be competitive.
5. Any compensation to milk producers to assist their adjustment to policy reform should be time-limited. The reduction in budgetary support costs this produces, will enable the EU to release funds to devote to other important and worthwhile issues, including the conservation of rural environments and the encouragement of rural development in less advantaged areas.
6. The gain is dependent on any subsequent compensation being completely de-coupled, that is, of a form which does not provide an incentive to produce more milk. If continuing support remains coupled to production, elimination of quota will cause a further economic loss to the EU of at least €207m per year, over and above the baseline policy costs, depending on the level of support.
7. The substantial restructuring implied by reform, as more efficient herds replace the less efficient, is not substantially different from that which will occur in any event. The key difference is that the benefits of this restructuring will be released to other areas of the economy, rather than locked up in dairy farm asset values (including quota).
8. There would also be a re-orientation of the milk processing sector away from price-supported commodities towards higher value-added products with significant welfare gains.
9. Careful consideration of adjustment processes strongly suggests that gradual policy change may not be in the best interests of producers or the industry. More rapid change may be less costly and traumatic, if combined with carefully designed, de-coupled producer compensation.
10. In conclusion, the present policy has become expensive and largely ineffective. Although transition to a fully liberalised market in milk and milk products may be difficult for some groups, this is not sufficient to outweigh the very considerable benefits of radical reform.

The INRA-Wageningen simulation system for the EU dairy sector

Abstract

This simulation system consists of two stand-alone models, one for milk and beef production on farms, the other for the processing of milk into dairy products and their allocation between domestic and foreign markets. The models simulate milk production, processing and market clearing in 14 EU member states (Luxembourg is included with Belgium).

The production model, developed at Wageningen University, is based on dual short-run profit and netput functions to which a stock and land adjustment component has been added. All behavioural equations are econometrically estimated. Quota rents for each member state have been estimated from FADN data by INRA-Rennes using a dual cost function approach, and this information has been used in calibrating the shadow supply function for milk. The processing and demand model, developed at INRA-Toulouse, breaks total milk supplies down into fat and protein components. Market demands for milk products drive the derived demands for the milk components, which are reconstituted into dairy products at market level. This procedure ensures that product supplies are consistent with raw milk supplies. Domestic and world markets for 14 dairy products complete the model. The model uses behavioural parameters and technical coefficients from a variety of sources.

The two models can be run separately (to simulate with-quota scenarios) or interactively (to simulate no-quota scenarios). Model outputs include production and prices of milk and dairy products, domestic and foreign off-take of dairy products, stock levels, beef output, feed use and stocking rates at member state level and for the EU as a whole. Producer and consumer surpluses, as well as the financial costs of a wide range of policy interventions, are also calculated. The policies simulated include changes in quota and price levels, different types and levels of direct payment for milk and beef producers (under various assumptions about decoupling), changes in domestic market disposal measures and various trade policy options. Policies involving deregulation (e.g. quota abolition with no intervention support) are also simulated.

Experiences of using a quadratic programming model to simulate removal of milk quotas

In this paper, we describe how a large programming model can be used to analyse the consequences of abolishing milk quotas.

The CAPRI supply model is a quadratic programming model of the EU agricultural sector. The model is disaggregated into 200 geographical regions and features about 30 production activities and about 50 inputs and outputs, of which four (skimmed milk powder, butter, cheese and other milk products) are derived from milk. The model is calibrated using a combination of positive mathematical programming with exogenous information on quota rents, land prices and supply elasticities.

The market component of the model is a multi-commodity market where demand is modelled by constant elasticity (double log) functions for each member state and rest of the world (ROW). Price transmission between the EU market and ROW works by behavioural net trade functions that yield a smooth response of net trade volume to changes in the price relation "EU price"/"border price". Net trade is calibrated to one observation.

The dairy industry is modelled by assuming that the raw milk is split up into fat and protein. Those components are combined with a processing cost to produce the derived dairy outputs. A maximum entropy sub-model is employed in the calibration step to assign consistent prices to milk components and contents of fat and protein to milk products.

The agricultural policy is represented by direct payments, subsidised exports, intervention sales and tariffs. Subsidised exports and intervention sales are modelled by behavioural functions that define intervened volume as a function of the price relation "market price"/"administrative price".

In particular, this work highlights the importance of different calibration techniques to combine inconsistent data into a robust model. The model was successfully used during spring 2002 to simulate the removal of milk quotas and market intervention for dairy products. The results show a slight increase of milk production if the direct payments are maintained after de-regulation, a result that has been verified by other recent studies.

The modelling exercises have also revealed some areas which are of specific importance for simulation results and where more work will be invested in the future. Such challenges include a more flexible feeding system, a calibration method that can include more empirical information into the supply response of the production activities and a better representation of the complex premium rights system.

How to Phase Out Milk Quotas - Possible Impacts on EU-Dairy Market and German Agriculture

Abstract

As a basis for political decision making, the FAL working group "Model supported assessment of policy impacts" has analysed a few scenarios of phasing-out the quota regime by 2008 and the corresponding consequences for German agriculture. For the quantitative assessment the FAL set of 'complementary models' has been used. The set includes two partial equilibrium models for agricultural product markets (GAPsi, MIPsi), mathematical programming models at regional, sectoral and farm levels (RAUMIS, FARMIS, BEMO) and an expert based dynamic simulation model for typical farms (TIPI-CAL). The idea of the complementary approach is the co-ordinated and parallel application of autonomous models covering particular fields of interest and following the principle of a bottom-up approach. One characteristic of the approach is that endogenous result vectors of one model are used as exogenous vectors for other models. By allowing interactive responses an iterative procedure can be employed which ensures reciprocal control of the results.

By analysing the impacts at the farm level several significant questions have been raised.

- Implementation of coupled/decoupled premiums

The analysis was carried out with respect to various systems of direct payments differing in the degree of being coupled to production. Milk premiums are granted only up to the milk quantity produced in the base year in contrast to Agenda 2000. To a large extent grassland premium can be regarded as partially decoupled from production. The premium volume „milk“ as well as headage payments within the market regulation for beef is transferred into a premium for grassland and other arable fodder crops (excluding forage maize). The grassland premium is not regionally differentiated.

- Assessment of distribution effects

The analysed transfer schemes indicate different distribution effects. Milk premiums lead to the smallest distribution effects of the analysed premium schemes because they are coupled to production. The income effects depend on the extent of compensation and the basis for direct payments. The grassland premium enhances the distribution effects of income due to the higher level of decoupling from production. The regional distribution effects might be reduced by a regionalisation of the grassland premium, but in this case the distribution effects between farmers would be not affected. The problem of quantifying the transmission effects of the grassland premium to the rental values of grassland is not solved yet.

- Consideration of saved quota costs

For the estimation of income effects in the phasing out scenarios savings of quota costs against the baseline are taken into account. The assessment of quota costs was achieved by generating equilibrium lease prices for milk quota in consequence of quota trade. Due to a lack of information concerning the ownership structure of milk quota the calculation of income effects was conducted for various shares of purchased/leased quota in a farmer's (region's) total reference quantity. The modelling approach shows the distribution effects between former lease-holders and active producers.