Final Report

An Examination of the Implications of Milk Quota Reform on the Viability and Productivity of Dairy Farming in Ireland

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Please tick below the appropriate area on the research continuum where you feel this project fits

BASIC/FUNDMENTAL → APPLIED/PRE COMMERCIAL

X

Key words: economic research, policy analysis, milk quota, viability
1. **Rationale for Undertaking the Research**

This research proposal was initially developed in 2005. At the time, the Irish dairy farming sector was undergoing a period of substantial change. The Medium Term Review (MTR) of the CAP, agreed in 2003, was introduced in 2005. This policy agreement allowed for the decoupling of all direct payments from production as well as agreeing a reduction in the intervention prices for butter and skim milk powder. Ex-ante analyses of the policy proposal predicted that the policy would expedite the process of structural change in dairy farming, with an increased number of farmers likely to exit the sector following the milk price reductions. These studies suggested that the future viability of dairy farming, following the MTR, would be largely dependent on the efficient transfer of resources between exiting farmers and those wishing to expand production.

Up to this time, milk quota transfer between farmers in Ireland operated exclusively through the milk quota restructuring scheme. Following the policy reform, officials at the Department of Agriculture, in conjunction with the main industry stakeholders, were considering changing the structures governing the transfer of milk quota between farmers. The importance of reviewing the milk quota transfer mechanism was acknowledged by the Agri-Vision 2015 committee. The Agri-Vision 2015 report, published in 2005, recommended that the reallocation of quota between farmers needed to be made more flexible and more responsive to farmers’ needs. The report called for an examination of the current quota reallocation process, with a view to ensuring that it was not in conflict with the emergence of a competitive low cost milk production structure.

It was in this context that the project proposal was developed. The aim of the project was to produce quality, scientific based policy advice on the most efficient means for the transfer of milk quota between dairy farmers. The main objective of the project was to identify milk quota transfer mechanisms that would ensure the viability of the maximum number of farmers in Ireland while still supporting an internationally competitive agricultural sector.

During the course of the project the Irish Department of Agriculture introduced a new milk quota transfer scheme. The milk quota exchange scheme was launched in November 2006. At this stage the objectives of the project were altered to be more policy relevant. Rather than exploring the efficiency of various milk quota transfer models, the aim of the project was redirected to explore the efficiency of the scheme as it was operated in Ireland. The rationale for this change was to provide relevant and timely feedback to policy makers on the operation of the new scheme.
While the MTR agreement guaranteed the continuation of the EU milk quota regime until 2014/15, it also made provisions for a review of the milk quota system to be conducted in 2008. Clearly any changes to EU milk quota policy would have implications for farmers in Ireland. A second objective of this project was to explore some policy scenarios that may transpire from the milk quota review and to estimate the implications for farmers in Ireland.

2. Research Approach

The main objectives of the project can be broken down into three tasks and each task required a different research approach. The tasks and research approaches adopted were as follows;

(1) To examine the efficiency of the milk quota exchange scheme
This objective here was to examine the operation of the milk quota exchange scheme in Ireland and to explore the implications for sector efficiency. To this end, an optimisation model was developed to estimate the economic value of quota. National Farm Survey (NFS) data for Ireland and FAPRI-Ireland price projections were used to estimate the economic value of quota for each dairy farmer in the survey. The optimisation model used a linear programming framework where farm profit was maximized subject to the physical and financial constraints on the farm and the policy related constraints, such as the milk quota. The economic value of quota was estimated as the sum of the discounted stream of annual cashflows between the current period and the period when quota is abolished. Individual economic values were then aggregated to derive quota sale and purchase curves. The intersection of the supply and demand curves indicated the equilibrium milk quota value. The model was run under a number of scenarios, (i) where quotas were only allowed to trade regionally so as to reflect the ring-fencing system and (ii) where quotas were allowed to trade nationally. Through the derivation of sectoral cumulative cost curves it is possible to estimate the impact of regionalising quota trade on sector efficiency.

(2) To examine the implications of a reform to the EU milk quota regime
The FAPRI-Ireland partnership group of models were used to examine the implications of changes to EU milk quota policy. The policy reform was first examined at an aggregate level using the Ireland and EU models. There are econometrically estimated partial equilibrium models of the agriculture sector that are solved under various policy scenarios to produce estimates of changes in the prices of inputs and outputs. These price and cost projections are then used in the FAPRI-Ireland farm level models to examine the implications of the policy change for farmers. First a set of profit maximising linear programming models are solved annually for each farm participating in the NFS. Farm net margin is maximised subject to physical, financial and policy related constraints. The LP models are then supplemented with three exogenous models of farmer behaviour. The first model estimates the effect of policy on the rate of entry and exit from farming and thus farm numbers by developing a multinomial
logit model of farmer retirement and succession decisions. Second, the effect of policy on the number of part-time farmers is estimated using a two-step sample selected corrected labour supply model and finally the decision to exit dairy production is estimated using a profit simulation model.

(3) To examine the implications of milk quota reform for farm production systems
The Moorepark Dairy Systems model (MDSM) was used to estimate the effect of a change in policy or milk quota transfer mechanisms on dairy farm production practices and overall farm profitability. The MDSM is a stochastic budgetary simulation model formulated within a Microsoft Excel spreadsheet. The model integrates animal inventory and valuation, milk supply, feed requirement, land and labour utilisation and economic analysis. Variable costs (fertiliser, contractor charges, medical and veterinarian, AI, silage, reseeding), fixed costs (machinery, maintenance and running costs, farm maintenance, car, telephone, electricity and insurance) and prices (calf, milk and cow) are based on current prices. The feeds offered (grasses, grass silage and concentrate) are determined by the MDSM meeting the net energy requirement for milk production, maintenance and live-weight change. The model was estimated under different milk quota scenarios to investigate how the optimal milk production system changes under each scenario.

3. Research Achievements

The main research results or achievements can be summarised under the three objectives outlined above.

(1) Summary results on the efficiency of the milk quota exchange scheme
The milk quota exchange scheme as it currently operates was simulated during the course of the project. To simulate the effect of ring-fencing, four regional markets for milk quota were estimated; the Border Midlands West region, the Southwest region, the East region and the South region. The results showed that the economic value of quota varied across the four regions, from 25 cent per litre (CPL) in BMW, 30.3 CPL in the East, 39.5CPL in the Southwest and 36CPL in the south. The results showed that if ring-fencing was abolished and quotas could trade nationally, the economic value of milk quota would be 35CPL. The implication is that if Ireland shifted to national milk quota trade, quota would move out of the BMW and East regions and into the South West. Results showed that the shift from a ring-fenced to a national quota exchange had only a negligible effect on total farm numbers, with numbers falling only 1.5 percent faster when quota is traded nationally. However, farm numbers declined substantially faster in the BMW and East regions when quota is traded nationally.
The implications for sector efficiency were measured using sector cumulative cost curves developed under the two scenarios. Under national trade the aggregate milk supply would be produced at a cost of €818.7 million. Under the regional scenario the cost was estimated at €845.9 million, approximately €27 million or 3 percent higher. It follows then that the practice of ring-fencing quota trade to particular regions introduces an inefficiency of approximately €27 million.

The results of the model were also compared to actual milk quota trade prices garnered from the first three exchanges. The results showed, as would be expected through economic theory, that there is a divergence between the value of quota and its trade price and that this divergence is more pronounced in some regions. In particular, quota is very overpriced in cooperatives in the south and east meaning that farmers are overpaying for milk quota in these regions.

(2) Summary results on the implications of a reform to the EU milk quota regime

Two milk quota expansion scenarios were analysed. Scenario 1 involved a 3 percent increase in the Irish national milk quota in 2008/09, while Scenario 2 involved a series of 3 percent increases from 2008 to 2014 totalling 21 percent. Both scenarios assumed quota abolition in 2015. The effects of the scenarios were measured against a baseline which assumed the EU milk quota continued unchanged over the period. Results showed that milk prices would decline under the two milk quota expansion scenarios. By 2014 milk prices would be 4 percent lower under Scenario 1 and 7 percent lower under Scenario 2.

Under Scenario 1 the results showed that, up to the point of quota elimination, the milk quota increase would be insufficient to offset the milk price decline and as a consequence farmers would be worse off. The results for Scenario 2 were more positive. The milk quota increases were sufficient to offset the milk price decline and as a result the typical producer increasing production by 3 percent per year would be better off than in the baseline. However, there are winners and losers under this Scenario. Farmers operating in regions with lower than average milk quota exchange prices would be better off under existing policy, as they have access to cheap quota and milk prices are higher. In general the results support that the Irish dairy sector would benefit from larger and faster increases in the milk quota.

(3) Summary results on the implications for production systems

When milk quota is limiting, farm profit is maximised by minimising production costs. When the quota is no longer limiting, most farms will find that land is the most limiting resource. In this case, the optimal production system involves maximising the utilisation of grass while at the same time minimising the requirement for purchased feed. The Moorepark Dairy Systems model was run to determine the optimum system of production under the various milk quota scenarios. The results suggest that when milk quota is no longer binding, dairy farmers will maximise profit by increasing the stocking rate on the grazing platform. The current optimal
stocking rate around the existing grazing platform is 1.8 cows per hectare. The analysis showed that this optimal would increase to 2.8 cows per hectare if there was no quota constraint on production. Results also showed that when the milk quota constrains production, the optimal mean calving date is mid to late February. When the quota constraint is relaxed the optimal calving date shifts to mid to early February. An important factor affecting the optimal calving date is the compactness of calving. Where 50 percent of cows are calved in 2 weeks and 90 percent are calved in 6 weeks, these calving dates should be later by one week in order to have good synchrony between supply and demand.

The research on milk quota expansion/abolition shows that the optimal production system would change in the following way;
- The mean calving date would be earlier, Feb 15th rather than March 15th
- Stocking rates would increase from 1.8 cows per hectare to 2.8
- Strategic use of supplementation to aid grassland management
- Increased focus on genetic selection of animals based on the Economic Breeding Index (EBI)

The results also show that increasing grass utilisation through increasing stocking rate will increase the efficiency of N use. The model results show that an increase of N efficiency from 24% to 38% when a production system increased stocking rate from 1.9 to 3.3 cows per ha. It can be thus suggested that lowly stocked farms should use less artificial nitrogen and highly stocked farms complying with the legislative directives will make more efficient use of nitrogen fertiliser. The phosphorous balance follows a similar pattern to the nitrogen balance.

4. Impact of the Research

The main research results have been outlined above. The dissemination of results and the impact of the research can be summarised under three main headings;

Policy Advice
The main objective of this research project was to provide scientific advice to policy makers on the effect of policy proposals/policy reform. Policy advice constituted one of the major outputs or impact factors for the project. The EU milk quota regime scenarios that were analysed were selected in consultation with policy officials from the Department of Agriculture. They were selected on the basis of being a possible outcome of the CAP Health Check, which was ongoing at the time. The scenarios were analysed and results were made available to policy officials and other industry stakeholders at a public conference. The main impact of this research was the provision of advice/information to policy makers in a timely fashion, i.e. while negotiations were still ongoing.
The other major piece of policy analysis conducted during the course of the project was the evaluation of the milk quota exchange scheme. Again at the request of policy officials in the Department of Agriculture, the operation of the scheme was evaluated with a view to estimating its efficiency and the implications for farmers’ viability. The results of this analysis are outlined above and were also presented to policy makers at the time. This allowed those involved in formulating the milk quota exchange regulations to act on the information if they wished.

Following the completion of these two pieces of policy analyses, members of the research team were invited to address the Minister’s Dairy Stakeholder forum, this is a high level meeting of industry stakeholders convened by the Minister.

**Stakeholder Interaction**

Dissemination of results to stakeholders constituted another major output or impact factor for the project. Some of the models developed during the course of the project produced results that were of direct relevance to farmers. In particular, the Moorepark model was used to estimate the maximum affordable price farmers should bid for quota. This information was disseminated to farmers at a very opportune time, i.e. just before the first milk quota exchange took place. These meetings, of which there were 15 around the country, provided farmers with valuable information on how the milk quota exchange would work and on what prices they should consider bidding. This activity contributed to the success of the first milk quota exchange scheme.

The analysis of the implications of EU milk quota reform and the implications for the optimal production system were also disseminated to farmers. Presentations were made at the Teagasc National dairy conference and a number of popular articles were published. Again the major impact of the research in this regard was to minimise the information gap that existed for stakeholders on what the future may hold with respect to milk quota policy.

**Scientific Publications**

A number of academic peer reviewed journal articles were published during the course of the project. These papers showcase the methodologies employed in the research rather than the actual results. The main objective is to ensure quality control in relation to the methods used in the research. Another major outcome or impact of this activity is to contribute to the intellectual/scientific understanding of how quotas operate.

5. **Exploitation of the Research**

The objective of this project was to conduct research on a number of issues pertaining to milk quota policy with a view to providing evidence based policy advice to government. As such, the
objectives of the project were not to generate any new technology or intellectual property that could be adopted by industry.

The recommendations arising from this research have been presented to officials at the Department of Agriculture, to officials at Teagasc and a large number of industry stakeholders at conferences and various other fora. The policy recommendations have been well aired and made publicly available. However, give the slow pace at which policy making occurs, it is as yet difficult to comment on whether the information produced by this project has been exploited.

6. **Summary of Research Outputs**

(a) Intellectual Property applications/licences/patents
   N/A

(b) Innovations adopted by industry
   N/A

(c) Number of companies in receipt of information
   N/A

(d) Outcomes with economic potential
   N/A

(e) Outcomes with national/ policy/social/environmental potential
   N/A

(f) Peer-reviewed publications, International Journal/Book chapters.


(g) Scientific abstracts or articles including those presented at conferences


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(h) National Report


(i) Popular non-scientific publications

N/A

(j) Workshops/seminars/open days at which results were presented (excluding those in (g))


Stakeholders’ Consultation on the Future of Milk Quotas – Held in Moorepark on November 8th.

Proceedings of Stakeholders’ Consultation


7. Permanent Researchers

<table>
<thead>
<tr>
<th>Institution Name</th>
<th>Number of Permanent staff contributing to project</th>
<th>Total Time contribution (months)</th>
<th>Average time contribution per permanent staff member</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teagasc RERC</td>
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<td>4.8</td>
<td>4.8</td>
</tr>
<tr>
<td>Teagasc MK</td>
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</tr>
<tr>
<td>UCD</td>
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<td>2</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
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8. Researchers Funded by RSF

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<th>Type of Researcher</th>
<th>Number</th>
<th>Total Time contribution (months)</th>
<th>Average time</th>
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<tr>
<td>Contract Researchers</td>
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<tr>
<td>PhD postgraduates</td>
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<tr>
<td>Masters postgraduates</td>
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<td>Temporary researcher</td>
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<tr>
<td>Other</td>
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<td><strong>Total</strong></td>
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</table>

9. Postgraduate Research

Total Number of PhD theses:___
Total Number of Masters theses: ____

10. Project Expenditure

Total expenditure of the project: €186,778.40

Total Award by RSF €203,125.00

Other sources of funding (specify) €
1. 
2. 

11. Future Strategies

Work is still ongoing on the preparation of papers for submission to peer reviewed journals.

12. Industry Collaboration

N/A