

End of Project Report

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**Economics of Cattle Production Systems
Post CAP Reform**

by

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Summary

The radical reform of the Common Agricultural Policy (CAP) in the early 1990's impacted directly and indirectly on most of the farm enterprises in Ireland. The direct focus of the reform was largely confined to the cereal and beef enterprises. The reforms consisted of:

- A phased reduction in the institutional support prices for cereals and beef of the order of 30 per cent
- A phased switch to a direct payment system of farm income support to compensate for the product price reductions.

Most farms in Ireland have a cattle enterprise, either alone or in combination with other land using enterprises. Therefore, the reforms of the CAP affected almost all the farms in the country either directly or indirectly.

Objectives

For cattle farmers, the potential consequence of these changes could be far reaching in terms of their magnitude and their permeation into the details of the husbandry practices of the production system(s) themselves. These changes clearly impact on the economic efficiency of beef systems without necessarily affecting technical efficiency of the systems. The economic optimum cattle production systems would thus be achieved by using the best mix of feed resource costs, carcass values and direct payments.

The purpose of the study was to:

- determine the economic impact on the cattle enterprise of the switch to:
 - lower EU prices for beef
 - lower EU prices for cereals and as a consequence a lower price for concentrate feeds
 - the direct payment system of income support
- identify the economic optimum cattle production system(s) that would arise from these changes
- quantify the sensitivity of the economic optimum system to key policy, economic and technical production variables.

Main findings

The overall findings are essentially the same for both the dairy calf to beef and the suckler systems. These can be summarised as:

- short production systems (approximately 24 months) are technically more efficient, i.e. they have better feed conversion, liveweight gains and land usage
- the higher technical efficiency does not result in maximum economic efficiency except when measured per hectare
- economic efficiency per hectare is of declining importance in the EU due to direct and indirect quota restrictions on:

- animal numbers
 - premium payments, and
 - alternative uses of land
- the value of the direct payments per hectare is essentially similar across production systems but the mix of premium payments varies greatly
 - as the value of the direct payments is predetermined it is imperative that beef producers concentrate on maximising the market based margin
 - with beef prices scheduled to decline, the main method of maintaining market margins is to reduce costs
 - feed is the main cost centre in beef production and grazed grass is by far the cheapest feed, about one fifth the cost of concentrates in Ireland
 - high weight gains from grazed grass can be obtained by using the longer, about 30 month, production systems which fully exploit compensatory growth at grass
 - matching the grass and fodder requirements of the animals with grass supply is very problematic especially when using a single cut silage system. Balancing grass supply and demand has become much more complex due to the coincidence of:
 - declining beef prices
 - the introduction of large direct payments which are tied to specific animals which have to be stocked within defined limits
 - declining concentrate feed costs
 - The availability of surplus grass creates serious methodological issues in relation to estimating the cost of conserved feed and determining its value relative to purchased concentrates
 - Surplus grass also causes management problems for both animal and pasture. In farm practice, these management problems are overcome through the use of big bale silage technology
 - The big bale silage system is very suitable technology for conserving relatively small quantities of surplus grass at strategically important intervals during the growing season
 - From a cattle farmers perspective, the cost of big baled silage derived from using surplus grass is the primary alternative to cost of purchased concentrates. This silage, because it uses surplus grass that must be removed for management reasons, has by definition a low opportunity cost
 - operating complete calf to beef systems on the same farm may be biologically more efficient and facilitates disease control, but the economic

efficiency of beef production could probably be best served by performing the rearing and fattening phases on different farms

- Performing the rearing and fattening stages on different farms allows for better:
 - exploitation of the differences in the land to labour ratios available on smaller and larger farms, and
 - matching of these different ratios with the differences in the land to labour requirements for the cattle rearing and fattening phases

- Compared with land and labour, cattle are a highly mobile and tradable entity at all stages in the production process. Therefore, in commercial farming this optimum mix of land and labour is readily achieved by inter-farm movements of cattle. The market place through price of cattle for various ages, weights and premium entitlements reconciles inter-farm differences in costs and abilities to avail of premiums

Introduction

The radical reform of the Common Agricultural Policy (CAP) in the early 1990's impacted directly and indirectly on most farm enterprises in Ireland. The direct focus of the reform was largely confined to the cereal and beef enterprises. The reforms consisted of:

- A phased reduction in the institutional support prices for cereals and beef of the order of 30 per cent
- A phased switch to a direct payment system of farm income support to compensate for the product price reductions.

For cattle farmers the potential consequences of these changes could be far reaching both in terms of their magnitude and their permeation into the details of the husbandry practices of the production system(s). The main issues from a beef producer's perspective were the resultant:

- changes in the revenue mix, due to an increased dependence on the direct payments and a declining importance of the price of beef, and
- changes in input cost structures, with the cost of concentrates declining relative to the cost of conserved fodder and grazed grass.

Most farms in Ireland have a cattle enterprise, either alone or in combination with other land using enterprises. Therefore, the reforms of the CAP affected almost all the farms in the country either directly or indirectly.

The purpose of this study was to:

- determine the economic impact on the cattle enterprise of the switch to:
 - lower EU prices for beef
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- identify the economic optimum cattle production system(s) that would arise from these changes
- quantify the sensitivity of the economic optimum system to key policy, economic and technical production variables.

Throughout the study there was a steady flow of requests for information, probably reflecting the radical nature of the CAP reforms and the rapidly evolving economic situation for cattle producers. As a consequence, a number of aspects of the study have already been reported in public presentations, research papers and two post-graduate theses have been presented from this research (see Appendix 1). The most detailed accounts of the methodology used and results obtained are contained in the theses by O'Neill (1996) and McEvoy (1998). In addition, the findings of this study were also used as a significant input into two other studies on:

- inter-country cost comparisons for beef (project no 4314), and
- production (policy) control options for beef (project no 4313).

This report reviews the main issues involved and summarises the main findings and conclusions arising from the study.

Approach and methods

The normal method of evaluating the impact of modest changes in the cost of inputs and the price of outputs is to examine their consequences for the costs and returns on a sample of cattle farms. In Ireland, the usual source of the sample farms is the National Farm Survey (NFS). However in the immediate aftermath of a radical shift in agricultural policy, as occurred in 1992, the data in the NFS were considered unsuitable due to:

- the magnitude of the changes in revenue mix and input costs, which were unprecedented,
- the existing information in the NFS reflected the cattle producers response to the old revenue mix and cost structures, and
- the inherent time lag in the data availability from the NFS.

The NFS data for subsequent years could eventually prove very useful in establishing whether the farmer's actual response to the new income support structures conformed to the findings of this study. For the immediate future it was therefore necessary to devise new and more specific methods for evaluating the economic impact for cattle farmers of such large changes in the economic and policy conditions.

Following a review of the technical literature on cattle production and in consultation with production experts at Grange Research Centre, a range of technically feasible beef production systems were defined. The main determinants of the systems were:

- the feed inputs required to achieve feasible animal growth rates, but without the use of growth promoters
- the duration of the production period required by the animals to achieve either a target weight or a specific age, and
- the compliance conditions for direct payments; age and sex of the animals and land to animal ratios, or stocking density.

It was necessary to establish and define the main parameters to be measured and compared for the different production systems. Efficiency is normally measured as the ratio of outputs to inputs or alternatively the ratio of inputs to outputs. A distinction must be made between technical (biological) and economic efficiency. For example, in beef production:

- biological efficiency is a physical measurement, measured in biological or physical units like weight gain per unit of feed input or per unit of time
- economic efficiency is measured in economic units and is generally expressed as the ratio of output value to input costs.

The reform of the CAP in 1992 has a number of effects on:

- the price of the inputs like cereals and concentrates, and indirectly the value of forage
- the price of beef and value of the output (carcass), and
- the possibility of obtaining revenue from direct payments.

Thus, it clearly impacts on the economic efficiency of beef systems without necessarily affecting the technical efficiency of the systems. Post CAP reform, the economic optimum cattle production systems would thus be achieved by using the best mix of feed resource costs, carcass values and direct payments.

Since CAP reform *per se* did not affect overhead costs on cattle farms, the parameters used in this study to identify the optimum economic beef production system(s) post CAP reform were:

- feed costs
- margin over feed costs
- market margin over feed costs.

The “market margin over feed costs” is a new measure and is calculated by excluding the value of the direct payments from the normal margin. For cattle production systems it is essentially the carcass value of the slaughter animal less the cost of the feed used. When the market margin is compared with the more normal margin it is possible to establish the relative response of producers to:

- the beef consumer markets and their requirements or
- the compliance criteria for the direct payments.

Cattle producers are primarily interested in the costs and margins obtained on the main resource inputs; animals and hectares. However, the policy maker and the exporter are more likely to be interested in the costs and margins per kilo of output as an indicator of the long term export competitiveness.

To allow for the maximum flexibility in the use of the findings of the study, the costs and margins were expressed per:

- animal,
- hectare, and
- kilo of beef produced.

When the results are available in this format they provide scope for:

- scaling-up the results to a specific farm situation, while also allowing for inter-farm differences in the restrictive factor of animals or land
- comparisons to be made between very diverse cattle production systems
- inter-country comparisons for costs and margins in beef production (see project no 4314).

In Ireland, cattle farming has two essentially parallel production streams depending on the source of the calf used. These are commonly referred to as beef produced by using:

- calves born into the dairy cow herd, and
- animals derived from the suckler cow herd.

To accommodate these separate production streams, the overall project was divided into two sections.

External factors

Over the period of the study there were significant changes in two major external factors that affected the findings. These were:

- changes in currency exchange rates and agri-monetary developments
- shifts in the market balance for beef in the EU.

Currency exchange rates: In the early years following CAP reform, there were a number of currency exchange rate changes and agri-monetary developments. These greatly blunted the immediate impact of the CAP reform for beef in Ireland. The impact of currency exchange rate developments and the agri-monetary adjustments was complex. This arose because the movements caused:

- an almost immediate increase in the price of beef, grain and concentrate feeds
- a time lag of up to one year was possible for the increase in the value of the direct payments
- an even longer time lag often occurred before the increases in the cost of forage production permeated the system via increases in the cost of oil, fertiliser and machinery.

Before the CAP reform was fully implemented in 1996, the direct impact of the currency changes were such that:

- almost half of the anticipated reduction in the support prices in IR£ for beef and cereals were negated, and
- the value of the direct payments in IR£ had increased by over 13 percent.

Market balance: For many years the price of beef and cereals in the EU, and particularly beef in Ireland, was severely depressed due to surplus production. For various reasons, and against expectations, these surpluses were dissipated in the mid-nineties. This resulted in the market prices for beef and cereals remaining high despite the reduction in the institutional support prices. The combined effect of the changes in the market balance and the monetary adjustments was that beef and cereal prices remained almost static until the BSE crisis in 1996. It was only at that stage that the full impact of the changes in institutional support arrangements began to impact at farm level in Ireland. To circumvent the problems arising from vagaries of market prices in the post CAP reform period, the study used the institutional support prices, IR£2.11 and IR£1.56 per kilo carcass weight, for normal intervention and safety-net intervention for beef, respectively. This enabled the results to be compared both within and across the dairy and suckler beef production systems.

For the comparison of the dairy calf to beef systems, a calf price of £150 was used. This reflected the prevailing market price at that time and sensitivity analysis was used to determine the impact of changes in the price of the calf on the overall findings.

Results

The most comprehensive reports on the methodologies used and the results obtained are available for:

- the dairy beef systems in the thesis by O'Neill (1996)
- the suckler beef systems in the thesis by McEvoy (1998) .

The following is a summary of the main findings and their implications for cattle production.

Dairy calf to beef production systems: For the complete dairy calf to beef production systems, the main findings are summarised as follows.

- short duration systems, calf to slaughter at approximately 24 months, are technically the most efficient as measured by both the live-weight and carcass-weight gain per unit of land area used and per feed input as measured by feed dry matter or feed metabolisable energy intake
- long duration systems, approximately 30 months, produce about 40 percent more live-weight but require about 50 percent more feed and land
- short and intensive systems are economically efficient in terms of land use but perform poorly per animal and per kilo
- long duration systems are more cost efficient by about 33 percent per animal and about 6 percent per kilo of beef produced
- systems of about 30 months duration gave the higher margin over feed costs and “market margin over feed costs” by 58 and 42 percent respectively
- the value of the direct payments obtained per hectare is similar for both short and long duration systems but the mix of payments acquired varies greatly
- short production systems have the higher market margins per hectare but the margin per animal and per kilo is small. To achieve these higher margins per hectare the short systems require more animals to operate the system and, therefore, the margins are very sensitive to both calf costs and beef prices. For example:
 - calf and feed costs account for approximately 70% and 50% of the value of the carcass for the short and long systems respectively, when beef prices are at regular intervention (IR£2.11 per kilo), but
 - calf and feed costs increase to over 90% and almost 70% of the value of the carcass for the short and long systems respectively, when beef prices decline to safety net intervention (IR£1.56 per kilo)
- short production systems are financially more risky, and compared to the longer systems they:
 - are least dependent on the value of the direct payments, which is predictable
 - are more dependent on the market based margin, which is very sensitive to the vagaries of both calf costs and beef prices
 - require more calves per tonne of beef produced as slaughter weights tend to be lower
 - have a high turn-over of animals which further exposes the system to the vagaries of calf costs and beef prices

Suckler calf to the beef production systems: For complete suckler calf to beef production systems most of the results conform to those reported above for dairy calf to beef systems. The main findings could be summarised as follows:

- feed costs per kilo of beef produced are essentially the same for short and long production systems
- an extra margin per cow and per kilo can be obtained by using the long production system. This extra margin is equivalent to:
 - 11 pence per kilo of beef produced, or
 - £24 to £28 per suckler cow unit
- short production systems provide the highest margin per hectare. But this advantage is reduced from £83 to £49 per hectare as the price of beef declines from normal intervention (£2.11/kilo) to the safety net level (£1.56/kilo)
- the proportion of the margin derived from the market, carcass value less feed costs, is about 3 percentage points higher under the short system. But the market based margin is highly sensitive to the price of beef. When beef prices decline from £2.11 to £1.56 per kilo, the market margin declines from about 55 percent to approximately 40 percent for both systems
- the margins in the short production system are more sensitive to:
 - concentrate feed costs
 - changes in the stocking rate requirements for direct payments
 - the market prices for beef

Consequently they are financially more risky but the system is more responsive to the consumer market for beef.

Overall implications: A number of implications arise for both the dairy calf to beef systems and the post “weanling stage” of suckler beef production. The main issues are:

- the ratio of the cost of the calves (or weanlings) to the price of beef is in the future expected to increase because:
 - beef prices are scheduled to decline as a consequence of the further reduction of the institutional support prices, and
 - calf and weanling prices are unlikely to decline to reflect the reduction in beef prices. As other reports have shown, (see Appendix 1), the increased availability of relatively large direct payments linked to eligible animals when combined with quota restrictions on calf supplies will result in:
 - the capitalisation of these direct payments into calf costs, and
 - an adjustment of the traditional relationship between calf costs and beef prices
- the move towards more expensive calves and weanlings relative to the price of beef has a number of consequences. The change in this ratio:
 - reduces the market based margin as a proportion of the total margin
 - increases the direct payment component of both margins and income
 - increases the importance of cost control as the primary mechanism to maintain both market based margin and income

- helps to resolve the conflict between the short and long duration production systems in relation to the economic return to land
- relatively expensive calves and weanlings causes the market based margin to decline. Should this decline be large and persist, then the producer becomes progressively less dependent on the consumer and isolated from the consumer requirements for beef
- expensive calves and weanlings increase the importance of the direct payments in determining margins and income. Should this persist then the economic incentive for the producer will be to protect the value of the direct payments they receive. This will be achieved by re-orienting the production system towards:
 - the compliance criteria for the direct payments (achieve the desired stocking density with eligible animals), and
 - reduce input costs
- reducing the cost of the feed has to be the main method of reducing costs because the farmer has little control over the cost of the calf or weanling and feed, in any event, is the other main input cost
- maximising the use of grazed grass, the cheapest feed, is the primary method of reducing feed costs
- maximum use of grazed grass is best achieved by exploiting compensatory growth through the use of the long duration production systems
- the apparent conflict between the margins per hectare and per animal and kilo of beef produced can be resolved by using the long production system under the prevailing combination of :
 - the increasing value of the direct payments
 - the declining price of beef
 - static or probably increasing calf and weanling costs
 - minimising feed costs through the maximum exploitation of grazed grass and compensatory growth, and
 - quota restrictions constraining alternative land using enterprises.
- Short production systems with a considerably higher financial investment in animals are more sensitive to interest rates, but this disadvantage will be reduced as interest rates decline with the advent of the euro
- Short production systems are more dependent on the continued availability of the deseasonalisation premium. The time of slaughter, in the spring, makes animals in this system eligible for the deseasonalisation premium if and when it is in operation.

Comparison of dairy calf to beef and suckler systems: The main economic features of the dairy calf to beef and the suckler systems are summarised in Table 1.

Table 1 Comparison of dairy and suckler beef systems				
	Dairy calf to beef systems		Suckler beef systems	
	Short	Long	Short	Long
	IR£ per kilogram carcass weight			
Revenue	2.78	2.94	2.95	3.08
Feed costs	1.40	0.99	1.00	1.03
Margin	0.90	1.55	1.94	2.00
	IR£ per hectare			
Revenue	1,731	1,156	1,037	845
Feed costs	871	387	354	280
Margin	561	607	683	565

The most important comparisons from Table 1 are:

- the revenues per kilogram carcass weight for the suckler systems are about 5 percent higher than for the corresponding dairy calf to beef systems, but
- the revenue per hectare for the short and the long duration suckler systems are 40 and 27 percent lower for the corresponding dairy systems
- the feed costs for the short dairy system are considerably higher than for any of the other systems, about 40 percent higher per kilo of beef and over double per hectare of land
- the costs per kilo of beef produced from the dairy systems are increased by 40 to 50 pence once calf costs of about £150 are included. This extra cost does not arise for the suckler systems
- the margin per kilo from suckler systems are much higher than the corresponding dairy systems, 29% and over double for the respective long and the short systems
- the margin per hectare for the short suckler system is considerably higher than for all the other systems, even the short dairy system. The differences between the other systems is surprisingly relatively small.

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