

Driving profitability per hectare: The Irish experience.

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Summary

- A resilient dairy business will be sustainable to survive milk price drops while being very profitable when milk price is high, while being sustainable across all of the sustainability indicators.
- The term resilient means able to “recover, respond, deal, withstand” different internal and external challenges that may manifest themselves within the farm business from time to time
- There is significant potential to increase efficiency and productivity at farm level when compared with the average farm nationally
- The focus at farm level must be about increasing grass growth and utilisation and converting that feed to milk solids sales in as low a cost as possible
- Increasing labour efficiency by operating more streamlined work practices, using contractors and contract rearing of heifers will have a major impact on labour cost – farm labour requirements, ultimately effecting the efficiency of the overall business

Introduction

Milk price volatility is a key feature of dairy farming today and this is likely to continue as the world market responds to changes in product supply and demand. In the past various levels of protection, operating mainly at EU level, provided market support at times when there was an imbalance in the global supply/demand dynamic. However, this protection has not operated at the market level to a large extent since 2007 (except in exceptional circumstances), which has meant that the milk price received by farmers is much more volatile now than experienced in the past (See Figure 1). Currently, milk price has reached a peak, from a trough which lasted over two years and caused many problems for virtually all dairy industries around the world. Ireland’s milk production represents approximately 0.9% of global production and irrespective of our scale or how much we expand; in general we are price takers. Recent global insecurities driven by geo-political events have created an atmosphere which suggests that increasing volatility should be expected into the future. This coupled with the issues associated with Brexit require dairy businesses to refocus on being highly profitable, labour efficient and low cost employing resilient technologies and prioritising all investment into making the farm more resilient. The term resilient means to be able to “recover, respond, deal, withstand” one or a number of shocks within any business. These shocks may originate in the form of weather events, disease incidence, troughs in milk prices, etc. How the business and system operated is implemented will determine the

capability of the business to respond to these events. There is considerable potential to increase profitability at farm level by focusing on the core technologies of grass-based systems and through having the right cow for our system (high milk solids, robust with good fertility). The objective of this paper is to lay out in both physical and financial terms what is needed to achieve a net profit (including all farming working expenses, all labour (paid and unpaid), depreciation and interest) per ha of €2,500 (\$NZ 4,250) at a milk price of €4.37/kgMS (\$NZ 7.14/kgMS). This paper will evaluate;

- a. Achieving €2,500/ha (\$NZ 4,250) net profit
- b. Return from investment in different technologies to drive performance
- c. Understanding the metrics in order to evaluate across business structure

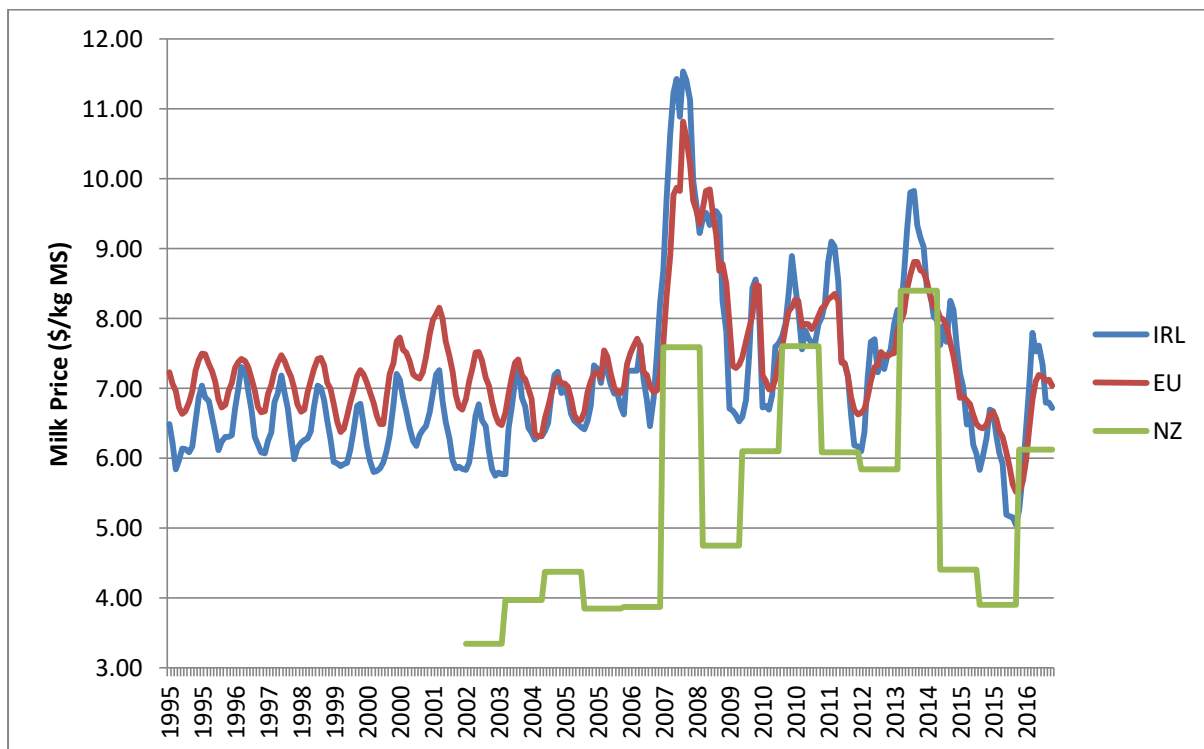


Figure 1. Milk price received by Irish, EU and New Zealand Farmers between 1995 and 2017.

a. Achieving €2,500/ha (\$NZ 4,250) net profit

The target system operated on farm is based on maximising the performance from the existing platform while at the same time ensuring there is a minimum number of unproductive livestock on the farm and that the farm is operating to its full potential. Realistically setting a net profit target of €2,500/ha (\$NZ 4,250) and achieving that target is based on significant attention to detail across all of the components of the farm business. However, the rewards are huge and it places the business in a very positive position when dealing with milk price volatility as well as realising returns from the business that are comparable with some of the best possible investments on or off farm. Whether you are achieving the target, close to the target or are a long way from the target the direction of travel should be the same for the business. The targets will be broken out in this paper under

physical and financial headings and will be compared to the national average performance over the period 2014 to 2016, all of which is completed with a base milk price of €0.29/l at 3.3% protein and 3.6% fat (€4.20/kgMS (\$NZ 7.14/kg MS excluding Vat). Labour costs are included at €15/hr (\$NZ 25.5/hr) and all other costs are included based on the most up to date costs and prices. It is assumed that the farm operates contract rearing in the target system and that calves leave the farm at 2 weeks of age, while in the national average situation it is assumed that calves are reared on the farm.

Physical

The key driver to achieving high profit per hectare centres on getting the physical performance of the farm to a very high level. Table 1 shows a breakdown of the physical farm performance included in the model in both the current national average and the target performance scenarios. Central to achieving the targets are both high animal and farm performance across a whole range of impact categories. The physical performance required to achieve the target include >13.1 t DM/ha of grass utilised, milk solids output of 1,380 kg/ha, while feeding low levels of concentrate <450kg per cow. In order to achieve these targets there is a requirement to have a highly fertile herd with a low replacement rate <18%, high six week calving rate circa 90%, with a herd mean calving date of mid-February. All of which are achieved with a farm operated at high levels of labour efficiency where the focus within the herd is on cows and grass, thus facilitating these achievements with total labour input of <16 hours per cow per year. Within table 1 the performance targets are compared to the national average performance over the period 2014 to 2016 for comparative purposes. Within the target situation there is an increase in stocking rate based on increases in grass growth but there is also a change in enterprise as all replacement stock are moved off the milking platform to a contract rearing enterprise. Cow numbers increase by 42% in the target scenario from 76 to 108. This increase in cow numbers is facilitated by both an increase in grass growth and subsequent utilisation but also through the removal of non productive stock from the milking platform. It is also assumed that higher fertiliser levels are applied under the target system with a higher level of annual reseeded carried out on annual basis.

Table 1. The physical performance required to achieve the national average or target performance at farm level.

	National Average	Target
Milk Yield kg MS/Cow	405	475
Milk Yield kg/Cow	5,409	5,800
Milk Protein %	3.45	3.70
Milk Fat %	4.06	4.50
Milk kg/Ha	11,090	16,820
Milksolids kg/Ha	825	1,380
Calving interval days	394	365
Mean Calving Date	6th March	14th Feb
Six Week Calving Rate %	58	90
Replacement Rate %	23	18
Labour Hrs/Cow	30	16
Stocking Rate Cows/Ha	2.05	2.90
Concentrate feeding kg/Cow	933	450
Herbage utilised T/Ha	7.8	13.1

Financial

Table 2 provides a breakdown of the financial performance of a farm that is achieving the physical outputs defined in table 1 for the national average and the target situation for a 35.6 hectare farm. The analysis is completed for the farm as a whole and on a per kg MS and per hectare farmed basis. Clearly the differences in financial performance between the national average and the target situations are very stark. The farm that is operating to the target performance levels is achieving 5.3 times more profit. The question centres on whether this is possible? The answer is very much dependent on whether you believe the physical performance outlined in table 1 is possible. If it is then the financial performance differences are real and are tangible.

Analysis from both the EProfit Monitor (software program) and the National Farm Survey have shown that the magnitude of performance difference between different cohorts of farms operating at the top and bottom levels of efficiency is huge. In order to understand the differences between the different categories of farms it is important to evaluate where the differences are coming from in table 2. The major change in performance is in the form of an output increase; there is a huge difference in farm receipts on the farm and per hectare with an almost 82% increase in outputs originating from a 72% increase in livestock sales and 84% increase in milk receipts. The milk output increases are based on higher value milk, higher milk yields per cow and the farm carrying higher stocking rates with the higher stocking rates facilitated by high grass growth and utilisation, while reducing concentrate per cow and per ha. There is little change in output per kg MS. On the cost side there are increases in overall costs per farm and per hectare to the tune of 30% but there is a dramatic reduction in costs per unit of output of the order of 28%. Therefore the expansion has occurred in the target system with the unit output costs reducing resulting in dramatic increases in profitability. This mirrors what has happened in the dairy industry since the

removal of milk quotas (Hanrahan et al., 2018). The major cost categories that showed reductions include concentrate feed and labour costs while other cost category reductions were based on the output growth per cow and per hectare and the removal of heifer rearing costs from each of the cost categories. Contract rearing costs for heifers had the opposite effect as this was included as a new category. In reality the total costs for heifer rearing have not increased that dramatically when comparing the average and target situations because when the heifers were contract reared there was a cost saving on the existing milking platform.

While there is a very strong increase in labour efficiency modelled, some of these increases are originating from the removal of heifer rearing from the labour requirements on the farm. Recent research has shown that there is substantial differences in labour efficiency across farm with the more labour efficient farmers tending to be larger, using the contractor more, more likely not to be rearing calves and more likely to have appropriate facilities (Deming et al., 2017). Ultimately the financial performance of the farm in relation to net profit has increased dramatically across all of the metrics shown, with net profit for the farm, per hectare and per kg MS increasing by 427%, 441% and 194% respectively.

Table 2 also includes the cash that is being generated from the farm. Essentially it is a reflection of the cash that is entering and leaving the business in any one period of time. It is an important metric because it reflects the business's ability to meet its long and short term cash commitments.. For the purpose of this analysis it was assumed that the labour costs and the drawings were equal (no single farm payment included). Table 2 shows in this scenario that the cash generated from the business is higher than the profit, this would generally not be the case where there was expansion with the business as the growth in stock numbers would be reflected in the profit figures but would actually be a drain on the cash flows. This has been evidenced on many farms over the past 8-10 years.

Table 2a. The financial performance of the national average and target farms.

		National Average			Road-map Target		
		Farm €	Per kg MS €	Per Ha €	Farm €	Per kg MS €	Per Ha €
Receipts	Milk	113,819	4.21	3,197	209,071	4.28	5,873
	Livestock	13,620	0.50	383	23,443	0.48	659
Inventory change							
Purchases	Livestock						
Gross Output		127,438	4.72	3,580	232,514	4.76	6,531
Costs	Concentrate	17,552	0.65	493	10,465	0.21	294
	Purchased Forage	0	0	0	0	0	0
	Fert/Reseeding	10,056	0.37	282	12,627	0.26	355
	Contract Heifer	-	-	-	21,587	0.44	606
	Contractor other	1,275	0.05	36	5,526	0.11	155
	Contractor Silage	6,195	0.23	174	5,328	0.11	150
	Vet/AI	8,006	0.30	225	12,320	0.25	346
	Elect/Phone/Car	6,747	0.25	190	7,594	0.16	214
	*Hired Labour	27,126	1.00	762	24,302	0.50	682
	Milk Recording and parlour	3,687	0.14	104	4,660	0.10	131
	Insurance	1,850	0.07	52	2,150	0.04	59
	Sundries/Other	2,273	0.08	64	3,551	0.07	100
	Machinery Lease						
	Repairs and Maintenance	2,500	0.09	70	5,000	0.10	140
	Land Lease	0	0	0	0	0	0
	Loan Interest	7,133	0.26	200	7,993	0.16	224
	Depr Buildings	11,812	0.44	332	15,042	0.31	422
	Depr Machinery	4,403	0.16	124	5,771	0.12	162
	Total	110,617	4.09	3,107	143,916	2.95	4,043
Profit	Operating Profit	23,954	0.88	673	96,531	1.98	2,713
	Net	16,821	0.62	473	88,598	1.82	2,489
Cash	Total	24,277	0.90	682	97,576	2.00	2,740
	ROA%	1.7			7.6		

*Hired Labour – All labour assumed to be hired

Table 2b. The financial performance of the national average and target farms.

		National Average			Road-map Target		
		Farm \$	Per kg MS \$	Per Ha \$	Farm \$	Per kg MS \$	Per Ha \$
Receipts	Milk	193,492	7.16	5,435	355,421	7.28	9,984
	Livestock	23,154	0.85	651	39,853	0.82	1,120
Inventory change							
Purchases	Livestock						
Gross Output		216,645	8.02	6,086	395,274	8.09	11,103
Costs	Concentrate	29,838	1.11	838	17,791	0.36	500
	Purchased Forage	0	0	0	0	0	0
	Fert/Reseeding	17,095	0.63	479	21,466	0.44	6.4
	Contract Heifer	-	-	-	36,698	0.75	1,030
	Contractor other	2,168	0.09	61	9,394	0.19	264
	Contractor Silage	10,532	0.39	296	9,058	0.19	255
	Vet/AI	13,610	0.51	383	20,944	0.43	588
	Elect/Phone/Car	11,470	0.43	323	12,910	0.27	364
	*Hired Labour	46,114	1.70	1,295	41,313	0.85	1,159
	Milk Recording and parlour	6,268	0.24	177	7,922	0.17	223
	Insurance	3,145	0.12	88	3,655	0.07	100
	Sundries/Other	3,864	0.14	109	6,037	0.12	170
	Machinery Lease						
	Repairs and Maintenance	4,250	0.15	119	8500	0.17	238
	Land Lease	0	0	0	0	0	0
	Loan Interest	12,126	0.44	340	13,588	0.27	381
	Depr Buildings	20,080	0.75	564	25,571	0.53	717
	Depr Machinery	7,485	0.27	211	9,811	0.20	275
	Total	188,049	6.95	5,282	244,657	5.02	6,873
Profit	Operating Profit	40,722	1.50	1,144	164,103	3.37	4,612
	Net	28,596	1.05	804	150,617	3.09	4,231
Cash	Total	41,271	1.53	1,074	165,879	3.40	4,658
	ROA%	1.7			7.6		

*Hired Labour – All labour assumed to be hired

b. Return from focusing on different technologies at farm level

In reality all of the increased financial performance shown in table 2 is based on different components of the farm system that can be changed within the farm gate to one extent or another. While there are in some circumstances physical farm constraints (e.g. soil type, climatic conditions) that prevent the full achievement of the targets, there is potential to make changes to increase key performance indicators on all farms and metrics. The focus should be on investing in the right areas on the farm to achieve those targets and ensuring that the direction of travel is correct for the farm not about the distance to travel. There are very few farmers that can say that they are in that target situation across all of the metrics shown.

Therefore it is imperative that we continue to remind ourselves of the potential to increase profitability from investment in basic technologies at farm level and to prioritise investment in these technologies (especially when milk price is high) in order to reap the dividends (especially when milk price is low). Table 3 highlights the net financial benefit from various increases in technical efficiency across the farm. This list is not exhaustive, but does set out the potential from these traits. These include;

1. Increasing fat concentration – From grass utilisation
2. Increasing protein concentration – From grass utilisation
3. Increasing milk volume – From grass utilisation
4. Increasing grass utilisation
5. Increasing the age profile of the herd
6. Reducing replacement rate
7. Reducing calving interval

A similar approach was taken to the analysis as highlighted in tables 1 and tables 2 on a farm size of 35.6ha

Table 3. Financial implications of improvement in various technologies operated at farm level

	Unit Change	Financial Benefit			
		€/Farm	\$/Farm	€/kgMS	\$/kgMS
Increasing Fat Concentration	0.1	1,195	2,032	0.03	0.05
Increasing Protein Concentration	0.1	2,530	4,301	0.09	0.15
Increasing Milk Volume – from grass	100L	2,027	3,446	0.06	0.10
Increasing grass utilisation	100kg DM/ha	484	823	0.01	0.02
Reducing Replacement Rate	1%	1,218	2,071	0.035	0.06
Reducing Calving Interval	1 Day	247	420	0.009	0.02

The analysis shows that improvements in each of the individual components of the farm have varying effects on the financial performance of the farm overall. All are positive in terms of the general operation of the farm and all have different effects on farm profitability. If we take an example of a farm with 35.6 ha and over a five year period they increase grass utilisation by 3 t DM/ha, milk fat concentration from 4.05% to 4.25%, milk protein concentration from 3.45% to 3.65%, reduce replacement rate from 23% to 20% and have a mean calving date that is one week earlier, they will increase their net profit on the farm by over €27,353 (\$46,500) and their profit per kg MS by €0.71 (\$1.21/MS), while increasing profit per hectare by €768 (\$1,306). This is all achieved while the cost base is reduced and value of what is sold from the farm is increased, which is ultimately increasing the resilience of the business as a whole. In the target system outlined in table 2, these different components

of the system are included to an even greater level and there is a dramatic increase in labour efficiency also included.

c. Understanding the metrics in order to evaluate across business structure

In reality, it is possible to be achieving very high performance on farm and to be not achieving the aforementioned target of €2,500 (\$4250) or close to it. If you are not achieving that target does that mean that you are a bad farmer or have a lot to improve? To answer that question we have to think of the myriad of different business structures that are now evident on dairy farms. For example some farmers now run dairy businesses but actually do not own land and therefore have invested less in the business overall and will ultimately have higher costs within the business as land rental may form a part of the overall cost structures. Therefore we need to evaluate the business by more than just one metric like net profit per hectare and we need to also use metrics that reflect the investment structure of the business in order to get a picture of the returns not alone from the operational side of the business but also reflecting the capital employed. If we focused solely on profit per hectare for example we may never expand the business as the reduction in performance initially would be viewed negatively or we may not look at options that might be good options for the business (e.g. leasing). Therefore it is important to ensure that when evaluating the business that we do not look at the net profit alone, but also that we look at the returns for the assets employed as a measure of the profitability of the business relative to the assets employed. This is an important metric because if we have two farmers with the same profit per hectare and one has double the amount of assets employed per hectare in the business then the potential for net worth growth is different than if both have the same level of total assets. This situation arises where the land that is farmed is not owned by the individual that is farming it whether through share milking, leasing or in any other form or where land value is lower per hectare, for example with poor or heavier soils.

ROA

ROA is a performance measure of profitability relative to the assets employed

Overall return on investment based on the total investment

$((\text{Income before interest and tax}) / \text{Total Assets})$

The profit achieved under the national average and target technical performance was further analysed under a scenario where land is owned and where land is leased. The calculations were completed assuming a land lease charge of €450/ha (\$765/Ha) and it was assumed that for every dairy cow in the system there was €3,500 (\$5,950) tied up in capital in the form of livestock and fixed assets. In the leased land scenario, this was the total assets employed in the business while in the land owned scenario there was €25,000/ha (\$42,500/ha) assumed for

land. The net profit figure was reduced by the land rental costs per hectare in the land leased scenarios.

Table 4 shows that in the national average scenario that profit drops to just about breakeven and ROA is slightly higher when the land is leased and in the target performance scenarios that even though the net profit per hectare reduces due to land rental costs that the return on assets is substantially higher when the farm is leased. As previously stated this reflects the profit achieved for the capital invested. A good target for return on assets from the literature suggests a figure of 5% over the costs of funds. If we take an example of costs of funds of 5% a target of >10% would be the benchmark when evaluating the business performance. It is important to use both metrics because as can be seen from table 4, if we only focused on the net profit per hectare we may not be identifying the business that will give higher returns overall. In the land leased scenario there is 3.35 times less capital tied up than in the land owned scenario. Another way of looking at it is if there was the same amount of overall capital in both scenarios, the land leased scenario operation could be 3.35 times bigger while still only having the same amount invested as the land owned scenario. While the profit per hectare is 18% lower the operation being 3.35 times bigger would result in a much higher overall return from the business. In the land ownership situation there could be potential to increase the returns through property price inflation. While this analysis might suggest that land ownership results in poor returns, there are other benefits around security of tenure that is not possible in the leased scenario. Ultimately a balance of ownership and leasing could provide both security of tenure as well as achieving the returns possible under the leasing scenario, with the combined business generating substantial returns overall.

Overall farms that are operating with national average levels of technical efficiency should not consider leasing additional land and should instead focus on increasing the efficiency of the business. Poor technical performance with increased costs due to land rental costs has the potential to generate significant problems in the business. On the contrary, farms that are operating up at the target technical performance have the potential to make very large returns in the leased scenario with returns of over 20% annually. Therefore, for a farm in this situation, driving technical performance on the milking platform, removing replacement stock and replace with dairy cows is the first step in the overall process. Then increasing the scale of the operation (e.g. leasing) will generate very strong returns for the business as a whole albeit with lower profitability on a per hectare basis.

Table 4a. shows the net profit for the national average and target technical performance under both land owned and land scenarios

		National Average		Target	
		Farm owned €	Farm Leased €	Farm owned €	Farm Leased €
Profit	Net	16,821	801	88,598	72,745
Profit	Net Ha	460	22.5	2,489	2,043
Investment		1,156,000	266,000	1,268,000	378,000
ROA(%)		1.7	1.6	7.6	21.3

Land lease costs included @€450/ha per annum

Table 4b. shows the net profit for the national average and target technical performance under both land owned and land scenarios

		National Average		Target	
		Farm owned \$	Farm Leased \$	Farm owned \$	Farm Leased \$
Profit	Net	28,596	1,362	150,617	123,667
Profit	Net Ha	782	38	4,231	3,473
Investment		1,965,200	452,200	2,155,600	642,600
ROA(%)		1.7	1.6	7.6	21.3

Land lease costs included @ \$765/ha per annum

Conclusion

In Ireland real expansion has only been possible for three years with the removal of milk quotas. To date this expansion has been associated with increased grass utilisation, increased milk value, reduced costs (excl. labour) at farm level. Focusing on ensuring that the overall business is resilient into the future will involve a continued focus on increasing grass growth and utilisation and matching the feed available on farm with the demand through operating the appropriate stocking rate. There is substantial potential for technical improvement at farm level across a whole range of areas. While it has to be recognised that there has been very good progress in the past number of years nationally, when evaluating a business it is important to not just focus on one metric. Profitability metrics should include metrics that reflect the level of the investment made in the business.

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