Economics of transitioning to Once A Day milking

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Summary

Introduction

In New Zealand, the practise of once a day (OAD) milking has been widely researched and adopted by hundreds of New Zealand's dairy farmers. In Ireland we estimate that less than fifty dairy farmers have fully adopted OAD in the past couple of years. For the majority of OAD farmers, reasons other than economic prompted the switch. Such reasons include lifestyle, farm structural or family situation. While economic considerations are rarely the primary driver of the change, the cost of the transition to OAD, while not well documented in the literature, needs to be estimated to better inform those considering the change the opportunity evaluate whether or not their farm business can sustain what is likely to be a reduction in output and income. With this in mind, the authors calculated the cost of transitioning to OAD on a case study farm.

Case study

The cost of transitioning an efficient, well run spring calving dairy farm from twice a day (TAD) to OAD milking was investigated using the Teagasc 6-Year Farm Business Plan. The farm, operated by the farmer in his early 30's and his father in his early 70's, comprises 82 ha in four sections. The milking platform is 40 ha and three remaining parcels vary in size from 12 to 16 ha. The farm milked 124 dairy cows in 2017 (3.1 cows/ha on the milking platform) and has 43 yearling and 47 weanling replacement heifers. Fertility of the herd is good with the calving interval in 2017 averaging 370 days with a six week calving rate of 90%. The farm has sufficient cubicles and slurry storage to accommodate 140 dairy cows and 50 LU of replacement heifers and also has a 20 unit milking parlour. Overall stocking rate in 2017 was 1.8 LU/ha.

Milk solids sold per cow was 425 kg (4.47% fat and 3.67% protein) in 2017. In the spring, cows were milked OAD during the month of February (from the start of calving on 2nd February) and again during December prior to drying off. The herd averaged an estimated 290 days in milk. The August 2017 herd EBI report is presented in Figure 1.

Animal Group	Num of Cows	Milk Kg / Fat % / Prot %	Surv% / Cl Days	Milk % Cont	Fertility % Cont	Calv % Cont	Beef % Cont	Maint % Cont	Mgmt % Cont	Health % Cont	EBI €
Cows with EBI	123	-80		€ 21	€ 59	€ 30	€ -10	€ 11	€ 2	€ 2	€ 116
Missing EBI*	1	3.3 / 0.11	1.7	15.5%	44%	22.4%	-7.1%	8.1%	1.3%	1.7%	
Total Cows	124	1.6 / 0.08	-3.2								

Figure 1. Herd EBI for the study herd (August 2017).

Assumptions

Table 1 shows the assumptions made in the case study farm in transitioning to OAD in cows milked and milk production.

Table 1. Base year (2017) and Year 6 (2023) herd size, stocking density and meal feeding assumptions used in the calculation of the economics of the TAD and OAD scenarios.

	2017	2023	
	Base	**TAD**	**OAD**
Herd size	124	125	135
Replacement LU	45	50	50
Milking Platform SR (cows/ha)	3.1	3.1	3.3
Overall SR (LU/ha)	2.1	2.2	2.3
Meal fed (kg/cow)	500	500	500

In the transition from TAD to OAD milking, an increase of 7% in herd size is assumed to allow for the reduction in dry matter requirement of the cows because of their lower milk solids yield and to partly compensate for the reduction in milk solids yield per cow. Increasing stocking rate when changing to OAD is widely practiced in New Zealand (Cooper and Clark, 2001). The number of replacement heifers was increased in both systems to 50 LU (50 0-1 yo's and 50 1-2 yo's). Surplus replacements heifers were sold in both systems prior to or just after calving. Meal fed per cow (500 kg) remained the same for both the OAD and TAD systems. Milk yield, composition and price assumptions used for both scenarios are presented in Table 2.

Table 2. Milk sales, composition, milk solids sales and milk price assumptions used in the TAD and OAD scenarios for the years 2018 – 2023 inclusive.

Year	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**
TAD							
Mllk sales (litres/cow)	5,036	5,086	5,137	5,188	5,188	5,188	5,188
Fat (%)/pr (%)	4.47/3.69	4.49/3.71	4.51/3.73	4.53/3.75	4.55/3.77	4.57/3.79	4.59/3.81
Milk solids sold (kg/cow)	427	433	439	446	448	450	452
Mllk price (c/l)	35.4	35.6	35.8	36.0	36.2	36.4	36.6
OAD							
Mllk sales (litres/cow)	5,036	4,028	4,125	4,275	4,275	4,275	4,275
Fat (%)/pr (%)	4.47/3.69	4.60/3.80	4.62/3.82	4.64/3.84	4.66/3.86	4.68/3.88	4.70/3.90
Mllk price (c/l)	35.4	36.6	36.8	37.0	37.2	37.4	37.6
Milk solids sold (kg/cow)	427	351	361	376	378	380	382

A reduction of approximately 20% in milk volume sales are assumed in the OAD scenario while fat and protein content are assumed to increase in line with previous research (Lembeye et al., 2016). Further increases in milk volume sales are assumed in both scenarios as outlined in Table 2. A base price of 30 c/litre is assumed in both scenarios with bonuses of 0.30 c/litre and 0.72 c/litre for 0.1% higher fat and protein content respectively. The higher composition is therefore reflected in the increasing milk price achieved over the 2018-2023 period. The replacement rates assumed for both the TAD and OAD systems in this case study are presented in Table 3.

Table 3. Numbers and percentages of replacements included in the TAD and OAD scenarios for the years 2018 – 2023 inclusive.

Year	2017	2018	2019	2020	2021	2022	2023
TAD							
No heifers introduced	27	27	35	35	35	35	35
% of herd	22%	22%	28%	28%	28%	28%	28%
OAD							
No heifers introduced	37	38	45	37	37	35	35
% of herd	27%	28%	33%	27%	27%	26%	26%

The average reduction in milk solids yield when herds are milked OAD varies from 18% to 25% depending on breed and lactation number. Research shows however that individual cows respond differently to OAD. Some produce close to their previous TAD milk solids yield and others produce less than half of their TAD yield. Thus a higher replacement rate of less suitable cows was assumed for the OAD system in the first three years of the change (2018-2020).

The replacement rate in both scenarios seems high particularly as the fertility of the herd is already good. In the TAD scenario, 10 of the 35 heifers introduced from 2019 onwards replace later calving cows. In the OAD scenario, a higher replacement rate in the 2018-2020 period is assumed to allow for the culling of cows that don't adjust well on OAD. In 2021 and from 2022, 7 and 10 respectively of the heifers introduced replace later calving cows. A slightly lower replacement rate is assumed because of the improved fertility performance anticipated (Stein, 2016). A summary of the expected income, production costs and cash flow on the farm in 2017, 2018 and in the last year of the budget, 2018 are presented in Table 4.

Opportunities to reduce costs of production were limited as the farm is already operating to a high standard already. Three areas for cost reduction were identified for the OAD system:

- Veterinary costs per LU were reduced by approximately 10% (€10/LU) to account for the improved health benefits of only bringing cows in for milking once per day;
- AI costs per cow were reduced by approximately 10% (€3/cow to €25) to account for further improvements in fertility as a result of the change to OAD;
- Hired labour, while already low, was reduced by €2,000 to account for the reduced requirement for relief milking in the evening.

Table 4. Total sales and premia, variable and fixed costs and net cash flow for the case study farm in 2017 and for the TAD and OAD scenarios in 2018 and 2023 (years 1 and 6 of the cash flow budgets).

	2017	2018		2023	
	Base	**TAD**	**OAD**	**TAD**	**OAD**
Cash income					
Milk sales[1]	€221,151	€226,461	€199,044	€237,627	€217,114
Calf sales	€10,585	€9,500	€10,500	€9,960	€9,960
Cow & in-calf heifer sales	€29,204	€35,400	€28,400	€45,000	€45,000
Empty heifer sales	€5,558	€6,300	€6,300	€4,500	€4,500
Cattle sales	-	€5,550	€5,500	€3,000	€3,000
Single farm payment	€39,000	€39,000	€39,000	€39,000	€39,000
Total	**€305,498**	**€322,211**	**€288,794**	**€339,087**	**€318,574**
Costs					
Dairy feed	€13,000	€13,105	€14,153	€13,105	€14,153
Replacement feed	€500	€513	€513	€569	€569
Fertiliser & lime	€23,665	€23,962	€25,362	€24,619	€26,019
Veterinary	€17,292	€17,452	€16,298	€17,930	€16,721
AI	€4,300	€4,307	€4,096	€4,439	€4,213
Contractor	€17,600	€17,821	€18,862	€18,309	€19,351
Other variable costs	€9,705	€9,827	€10,401	€10,096	€10,671
Hired labour	€10,181	€10,266	€8,149	€10,547	€8,360
O/D interest & loan repayments	€13,566	€13,991	€13,911	€13,991	€13,991
Machinery costs	€7,000	€6,844	€7,244	€7,032	€7,432
Car, ESB, phone	€8,654	€8,726	€7,244	€8,965	€7,432
Land lease	€3,900	€3,900	€3,900	€3,900	€3,900
Other fixed costs	€18,064	€17,109	€18,109	€17,579	€18,579
Total	**€147,337**	**€147,822**	**€148,323**	**€151,082**	**€151,391**
Net cash flow[2]	**€158,161**	**€174,389**	**€140,470**	**€188,005**	**€167,183**

The graphics in Figure 2 show the change between years in net cash flow for the TAD and transitioning OAD systems of milk production.

[1] Milk sales using a base milk price of 30 c/litre as detailed in Table 2.

[2] Net cash flow is the residual cash to reward the farm operator and for tax liabilities.

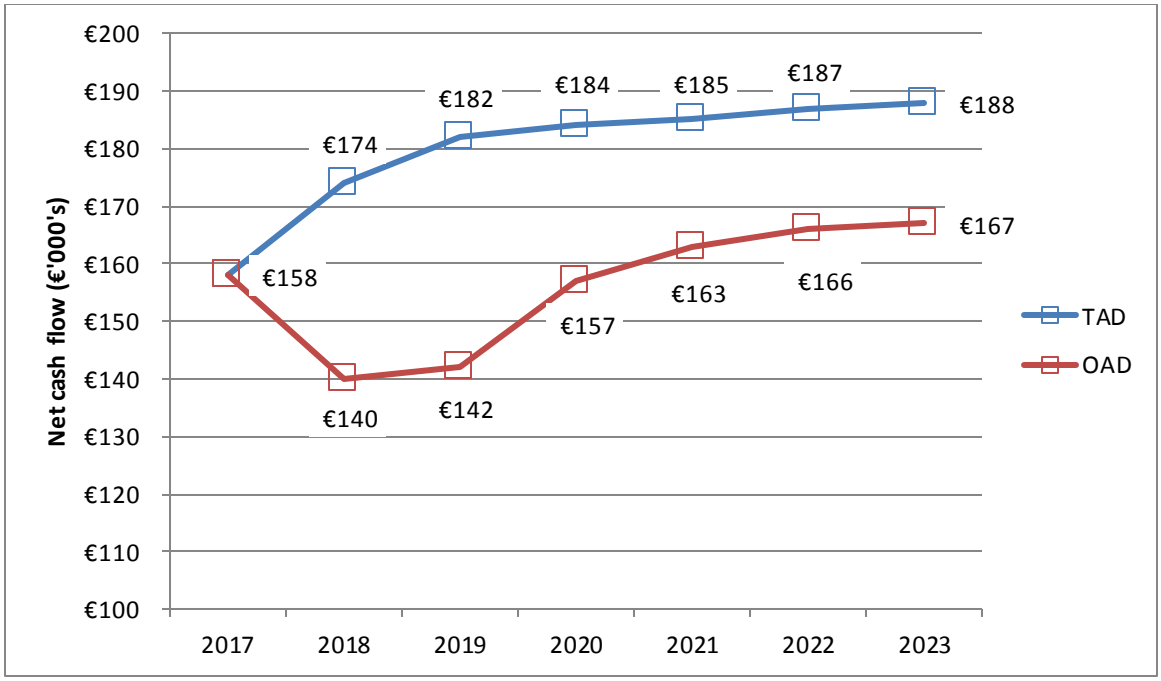

Figure 2. Change in net cash flow (€,000's) from the base year (2017) to year 6 of the business plan (2023) for the TAD and OAD scenarios.

Using the assumptions outlined, year 1 (2018) is the year when the greatest impact on cash flow occurs with a difference of €34,000 between TAD and OAD scenarios. Thereafter the difference in net cash flow declines by approximately €3,000 p.a. and by year 6 has declined to approximately €21,000. The anticipated narrowing of the difference in net cash flow projected in this analysis is supported by previous OAD farm accounts analysis from New Zealand (Anderle and Dalley, 2007). Projecting the cash flow still further suggests that further narrowing of the difference in the financial performance of the two systems is possible.

Conclusions

From a net cash flow perspective, the TAD scenario remains the superior system. However we expect that the hours worked by the case study farmer could be reduced by an estimated 2 hours per day for 200 days because of the elimination of the evening milking having allowed an additional 30 minutes per day for morning milking to account for the increased daily milk volume.

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