



DAIRY HERD FERTILITY

CHALLENGE NOTE C - The Cost of Extended Calving Intervals

This Challenge Note attempts to quantify the cost of extending the calving interval in a logical sequence with clearly defined assumptions.

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The reduced annual milk output associated with extended calving intervals has already been discussed in Challenge Note A: Extra Profit from Improved Herd Fertility. Cows with extended lactations spend proportionately longer in both late lactation (lower daily yields) and the dry period, thereby reducing the average daily milk yield per lactation. Calculating the true cost of extended calving intervals is a complex process with many factors having to be taken into account. This Challenge Note attempts to quantify the cost of extending the calving interval in a logical sequence with clearly defined assumptions.

The Extra Cost of Extended Calving Intervals

Calculating the true cost of extended calving intervals is a complex process with many factors having to be taken into account. These include:

- yield of the cow;
- lactation curve;
- length of calving interval;
- milk price;
- calf price;
- cost of feeding dry cows.

However some costs are reduced with extended calving intervals and some extra income can be generated by extending the cows lactation. These include:

- cost of production diseases associated with calving;
- concentrate feed costs for milking cows;
- savings in quota leasing costs;
- higher compositional quality milk in the extended part of the lactation.

In addition, extending the time between calving and conception increases milk output by about 1.0 litre per day of lactation extension. These costs have been well documented by the University of Reading and have been adapted below to a Northern Ireland dairy-farming context.

Yield Potential of the Cow

The profile of the cow's lactation curve varies with milk yield. Higher yielding cows have a flatter lactation curve than lower yielding cows as shown in Table 1. For example the expected peak yield for a 6000 litre cow is obtained by dividing the 305 day yield by 206, while the peak yield of a 10,000 litre cow is obtained through dividing by 233. To meet their nutritional needs, higher yielding cows require a higher level of concentrate feeding as shown by the increase in concentrate feeding rate from 0.25 to 0.35 kg/litre.

Table 1: Lactation curves and lactation yields.

305-day feeding rate (litres)	Peak yield factor	Weekly yield decline(%)	Concentrate yield (kg/litre)
6,000	206	2.50	0.25
8,000	219	2.05	0.30
10,000	233	1.60	0.35

Source: Adapted from University of Reading

Lactation Curve

If cows can be managed to produce flatter lactation curves, i.e. lower weekly decline in milk yield from peak, lost milk yield from extended lactations will be reduced.

Length of Calving Interval

As the interval between calvings increases, the length of time spent dry before the next lactation increases. This is more pronounced with lower yielding cows as shown in Table 2. For example, a 6000-litre cow with a calving interval of 15 months milks for 52 weeks and is dry for 12 weeks. However at 52 weeks the 6000-litre cow is only yielding 9-10 litres per day. Such relatively low yielding cows with long calving intervals may be dry for longer.

Impact of Calving Interval on Lactation Yield and Annual Milk Yield

Cows with extended lactations spend a greater proportion of time in late lactation when daily milk production is lower. This results in lower annual milk production from herds of the same genetic potential as the calving interval is extended. The data presented in Tables 3 to 5 for cows with yields of 6000 to 10,000 litres shows the impact of extended calving intervals on lactation yield, annual yield, average daily yield between calvings and drying off milk yield.

Table 3: Calving interval, lactation yield, and annual yield (6000 litres, 305-day yield).

	Calving interval (months)		
	12	15	18
Lactation yield (litres)	6000	6638	6934
Annual yield (litres/365 days)	6000	5314	4627
Average daily yield (litres)	16.4	14.6	12.7
Drying off milk yield (litres)	11	9	8

Table 2: 305-day yield, calving interval and dry period.

Yield (litres)	Calving interval (months)					
	12 months		15 months		18 months	
	Milking (weeks)	Dry (weeks)	Milking (weeks)	Dry (weeks)	Milking (weeks)	Dry (weeks)
6000	44	8	53	12	58	20
8000	44	8	54	11	62	16
10000	44	8	55	10	65	13

Table 4: Calving interval, lactation yield, and annual yield (8000 litres, 305-day yield).

	Calving interval (months)		
	12	15	18
Lactation yield (litres)	8000	9068	9774
Annual yield (litres/365 days)	8000	7258	6522
Average daily yield (litres)	21.9	19.9	17.9
Drying off milk yield (litres)	17	14	12

Table 5: Calving interval, lactation yield, and annual yield (10000 litres, 305-day yield).

	Calving interval (months)		
	12	15	18
Lactation yield (litres)	10000	11655	12924
Annual yield (litres/365 days)	10000	9329	8624
Average daily yield (litres)	27.4	25.6	23.6
Drying off milk yield (litres)	23	20	17

Costs of Extended Calving Intervals

The cost of extending the calving interval increases with the length of calving interval extension as shown in Table 6. The costs shown are specific to the delay interval period. For example, each day from 396 to 425 days costs £2.34 for an 8000-litre cow. The average cost per day is calculated from the number of days of calving interval extension in each delay interval. The costs are lower for higher yielding cows due to their flatter lactation curves and ability to add more milking days to the lactation.

The data in Table 6 is based on the following price assumptions:

Milk price18.0 ppl
Quota leasing price3.0 ppl
Calf price£65
Concentrate price£150/tonne
Cost: Slip in calving pattern£0.35/day
Cost: Extra vet treatments and AI£0.70/day delay
Savings: Disease & fewer calvings£0.43/day delay
Higher milk quality (after 305 days)1.98 p/litre

The calculations assume a target calving interval of 365 days. Where cows are given a deliberately long voluntary waiting period (VWP), extra days will be added to the calving interval without incurring the extra veterinary treatments and AI costs of £0.70/day.

Table 6: Cost per extra day extension of calving interval in consecutive delay intervals (£/day).

Calving interval (days)	365-380	381-395	396-425	426-455	456-485	486-515
6000 litres	1.53	2.19	2.42	2.71	2.96	3.20
8000 litres	1.51	2.04	2.34	2.70	2.94	3.12
10000 litres	1.32	1.59	1.97	2.42	2.72	2.96

Source: Adapted from University of Reading

Sensitivity Analysis

The costs per day of lactation extension presented in Table 6 vary according to the value of key inputs and outputs involved.

- Milk price and quota leasing price are the most sensitive output costs.
- As milk price increases, the cost per day of extended calving interval increases. As leasing prices rise, cost per day of extended calving interval falls.
- As concentrate price or usage rises, the cost of each extra day of extended calving interval falls.

Breakeven Calving Interval before Culling Individual Cows

As the interval between calvings increases, the total lost output will accumulate until it becomes more financially viable to replace the cow if her calving interval becomes too

long. Table 7 shows the cumulative losses encountered as the calving interval extends for cows of 305-day milk yield ranging from 6000 to 10,000 litres.

The figures in Table 7 indicate that the cumulative cost to an 8000-litre herd calving at intervals of 395 days incur an annual cost of £53 per cow or £5300 for a herd of 100 cows compared to a herd calving at 365 day intervals on average.

Given the value of inputs and outputs quoted above, it is financially viable to continue trying to get cows in calf for up to 10 months after calving. Some genetically superior cows within the herd, and cows with very persistent lactation curves may be worth inseminating beyond this point.

Table 7: Cumulative cost of extended calving intervals (£/cow).

Calving interval (days)	395	455	515	575	635
Months post calving	4	6	8	10	12
6000 litres	56	210	394	607	847
8000 litres	53	204	386	596	859
10000 litres	44	175	345	551	828

Source: Adapted from University of Reading

Summary

- As calving interval increases, annual herd milk output is reduced and the number of days in the dry period increases.
- Each day of calving interval extension costs from £1.30 to £5.00 depending on milk yield and length of extension.
- Low yielding cows generally lose more income per day of extension than high yielding cows.
- For extended calving intervals to be viable, cows need to have very persistent lactations that require very high standards of management.
- The breakeven point after which further breeding of individual cows is not worthwhile, is from 10 months after calving, but depends on milk yield.