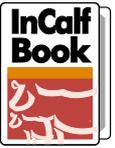# Calving pattern tool

What is this tool?

This is a **gap calculator** tool. It assesses the pattern of calving in a given calving group and its impact on herd reproductive performance.

Why use this tool?

In seasonal and split calving herds, calving pattern (i.e. the spread of calvings in a given calving group) has a major impact on subsequent herd reproductive performance. Cows that calved in the first three weeks of calving typically have 6-week in-calf rates around 70% whereas very late calved cows (cows calved after week 9 of calving) typically have 6-week in-calf rates around 20%. Not-in-calf rates are also affected.

This tool enables you to measure the pattern of calvings in a given calving group and identify the gap between the actual and desired calving pattern. The tool then enables you to assess the $ benefits of improved herd reproductive performance from closing this gap.

For more information, see **The InCalf Book**, Chapter 16: Managing your calving pattern – seasonal and split calving herds and the **InCalf Fertility Focus Report**.

InCalf Book

See pp 149-156

How to use this tool

First, choose whether you want to assess **past performance** (the likely impact of a calving period's pattern on your herd reproductive performance in the past) or **present/future performance** (EITHER the likely impact of the calving period just completed on reproductive performance in the impending mating period OR the likely impact of an upcoming calving period on subsequent reproductive performance).
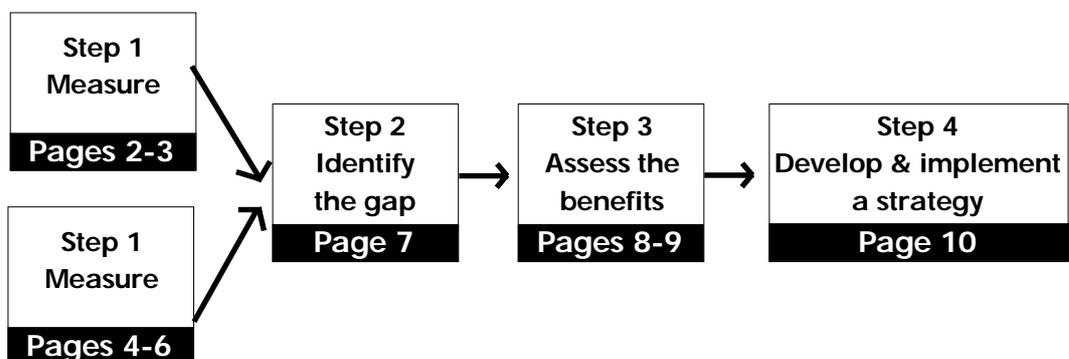
Then work through this tool's four basic steps:

Note: For use of this tool in **split calving herds**, see page 9.

To assess past performance

OR

To assess present/ future performance

| Step 1 Measure **Pages 2-3** | Step 2 Identify the gap **Page 7** | Step 3 Assess the benefits **Pages 8-9** | Step 4 Develop & implement a strategy **Page 10** |

| Step 1 Measure **Pages 4-6** |

When you see this symbol ✍, this means you need to fill in some information or do some calculations before continuing.
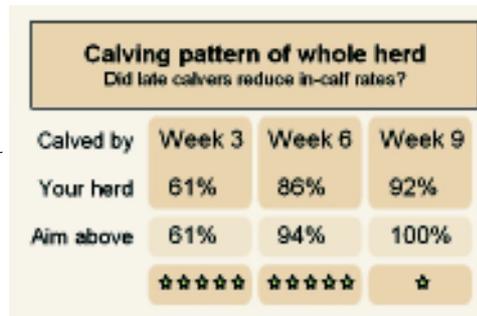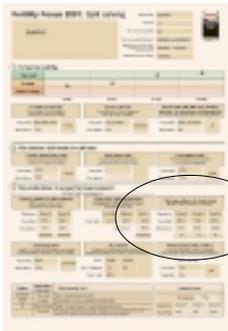
Assess past performance

Step 1) Measure

OPTION 1 (preferred): **If you have an** *InCalf Fertility Focus Report*

If you *do* have an *InCalf Fertility Focus Report this will automatically calculate the % of cows calved by weeks 3, 6 and 9 (i.e. the calving pattern of the whole herd). Assess* your star rating).

Here's the place to look on <u>your</u> *InCalf Fertility Focus Report*:

➡ ③ **Key indicators to areas for improvement**

Calving pattern of whole herd
Did late calvers reduce in-calf rates?

Calved by	Week 3	Week 6	Week 9
Your herd	61%	86%	92%
Aim above	61%	94%	100%
	★★★★★	★★★★★	★

Now go to Step 2 on page 7. ☞

OPTION 2 **If you do not have an** *InCalf Fertility Focus Report*

If you *do not* have an *InCalf Fertility Focus Report*, you can still calculate the % of cows calved by weeks 3, 6 and 9 manually and assess past performance. You will need a calculator.

Part 1: Complete Table 1 *(next page)*

- First, calculate the calving dates that corresponded with the end of weeks 3, 6 and 9 in the past calving period, assessed from the group's planned start of calving date.

What was your calving group's planned start of calving? ____/____/____ (a)		Calving category in most recent calving ✍
Add 20 days ____/____/____ (b)	This is the end of week 3 – any cow that calved up to (b) calved in the first 3 weeks	Early
Add 21 more days ____/____/____ (c)	This is the end of week 6	Medium
Add 21 more days ____/____/____ (d)	This is the end of week 9	Late
	Any cow that calved after (d) calved after week 9	Very late

The group's planned start of calving date is the expected calving date for cows that became pregnant on mating start date. It is the first day that cows are *due* to calve – 282 days after mating start date. Of course, because pregnancy length varies, some cows will calve before the herd planned start of calving date. See Appendix on page 11 to calculate your planned start of calving date.

- Obtain a list of cows in order of calving date.
- Using this list, count the number of cows that calved in each calving category (early, medium, late, very late) and enter these values in the right-hand column in Table 1, below:

Table 1:

Week of mating when conceived	Calving category at most recent calving	Total no. that calved
Weeks 1-3	Early	☐ (A)
Weeks 4-6	Medium +	☐ (B)
Weeks 7-9	Late +	☐ (C)
After week 9	Very late +	☐ (D)
Total no. to calve	=	☐ (E)

Part 2: Use the numbers calculated in Table 1, above, to calculate the % calved by weeks 3, 6 and 9 in the past calving period.

☐ (A)   x 100 ÷ ☐ (E) = ☐ (F)
Total calved Early (weeks 1-3)   Total no. calved   % calved by Week 3

(☐ (A) + ☐ (B))   x 100 ÷ ☐ (E) = ☐ (G)
Total calved early (weeks 1-3)   Total calved medium (weeks 4-6)   Total no. calved   % calved by Week 6

(☐ (A) + ☐ (B) + ☐ (C)) x 100 ÷ ☐ (E) = ☐ (H)
Total calved early (weeks 1-3)   Total calved medium (weeks 4-6)   Total calved late (weeks 7-9)   Total no. calved   % calved by Week 9

**Now go to Step 2 on page 7.** ☞

Assess present/future performance

Step 1) Measure

The likely calving pattern for the upcoming calving period can be determined if you have accurate estimates of each cow's due calving date. Early rectal pregnancy testing is the most accurate strategy (**The InCalf Book**, page 162).

After this step, you will know the cumulative % of the herd that will calve by weeks 3, 6 and 9 in the next calving period. To calculate this, complete Table 2, on page 5, by following the directions below.

First, estimate the likely calving pattern for the upcoming calving period with no calving induction. Then, if you plan to induce calving in some cows you can repeat the method taking calving induction into account.
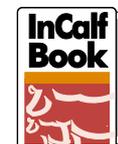
InCalf Book

See page 162

Part 1: Complete Table 2 (next page)

Complete Column i

- Complete early rectal pregnancy testing (*The InCalf Book*, page 162) to accurately identify when cows conceived in the most recent mating period.

- Obtain a list of cows in order of due calving date, based on pregnancy testing results:
    - ask your pregnancy testing service provider for this; or
    - alternately, you can obtain this from some farm software or prepare this list manually.

- Cross all cows off this list that will be culled before next calving.

- Work out the planned start of calving date for the upcoming calving period:
    - you will need the mating start date for the most recent mating period to do this; and
    - either look up a breeding table (on wall charts or in some diaries) or use a Planned start of calving calculator. (See Appendix – Planned start of calving calculator, page 11).

- Calculate the calving dates that correspond with the end of weeks 3, 6 and 9 in the upcoming calving period:

What is your calving group's planned start of calving?			Expected calving category at next calving	
	____/____/____ (a)			
Add 20 days	____/____/____ (b)	This is the end of week 3 – any cow due to calve up to (b) is due to calve in the first 3 weeks	Early	✍
Add 21 more days	____/____/____ (c)	This is the end of week 6	Medium	
Add 21 more days	____/____/____ (d)	This is the end of week 9	Late	
		Any cow due to calve after (d) is due to calve after week 9	Very late	

- Using the list of cows in due calving date order, count the number of cows that will calve in each category. At this stage, don't consider calving induction or include heifers approaching their first calving.
    - This now tells you how many cows (not first calvers) are expected to calve in each calving category *if no cows are induced to calve.*
    - Enter these values in Column i in Table 2 on page 5.

Complete Column ii

- Complete the next column of Table 2 (column ii). This shows how many first calvers are due to calve in each category.

- If you did not complete early rectal pregnancy testing of heifers approaching their first calving, make some estimates. You could base your estimates on the previous calving pattern for your first calvers. The percentages of first calvers calved by weeks 3 and 6 are shown in your *InCalf Fertility Focus Report*.

  Here's the place to look on your *InCalf Fertility Focus Report*:

➡ ③ **Key indicators to areas for improvement**

Calving pattern of first calvers
Well managed heifers get in
calf quickly and calve early.

Calved by	Week 3	Week 6
Your herd	72%	88%
Aim above	73%	92%
	★★★★★	★★★

- Multiply the %s calved by Week 3 and Week 6 by the total number of first calvers to calve.

Complete Column iii

- Calculate the numbers that will calve in each category by adding i + ii for each category in Table 2 and writing the totals in column iii

- Add the numbers that will calve in each category to give the total number of cows that will calve; write this number in the 'Total no. to calve' row (E).

- Ensure this total number of cows is the same as your planned number that will calve. If it is not, check all columns for errors and correct.

Table 2:

Week of mating when conceived	Expected calving category at next calving	Column i No. of cows (except first calvers) due to calve in each category	Column ii No. of first calvers due to calve in each category	Column iii Total no. that will calve (i plus ii)	
Weeks 1-3	Early				(A)
Weeks 4-6	Medium				(B)
Weeks 7-9	Late				(C)
After week 9	Very late				(D)
Total no. to calve					(E)

If you plan to induce calving in some cows

Repeat the method above taking calving induction into account and adjust the numbers in Table 2. (See *The InCalf Book*, page 154)

InCalf
Book
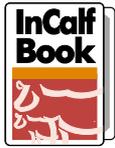
See page 154

- Change numbers in column i of Table 2 as some cows due to calve late and very late will calve in earlier categories:

    – Estimate how many cows will be induced from late and very late categories.

    – 'Move' these cows to earlier calving categories by adding numbers to earlier calving categories and deducting equivalent numbers from later calving categories.

    – Enter the new totals in Column i.

Column i now shows how many cows (not first calvers) expected to calve in each calving category.

- Now recalculate numbers that will calve in each category in Column iii of Table 2 before proceeding to Part 2, below.

Part 2: Use the numbers calculated in Table 2 on page 5 to calculate the likely % calved by weeks 3, 6 and 9 in the next calving period.

[ ] (A)
Total due to calve
Early
(weeks 1-3)

x 100 ÷ [ ] (E) = [ ] (F)
Total no. that will calve
Likely % calved by Week 3

([ ] (A) + [ ] (B))
Total due to calve (weeks 1-3)   Total due to calve (weeks 4-6)

x 100 ÷ [ ] (E) = [ ] (G)
Total no. that will calve
Likely % calved by Week 6

([ ] (A) + [ ] (B) + [ ] (C)) x 100 ÷ [ ] (E) = [ ] (H)
Total due to calve (weeks 1-3)   Total due to calve (weeks 4-6)   Total due to calve (weeks 7-9)   Total no. that will calve
Likely % calved by Week 9

Step 2) Identify the gap

Complete Table 3, below, as follows:

Complete column iv

- If you are assessing a past calving period, record the % calved by weeks 3, 6 and 9 for your herd either from your *InCalf Fertility Focus Report* or from calculations on page 3 (F, G, H).

- If you are assessing the upcoming calving period, record the likely % calved by weeks 3, 6 and 9 for your herd from calculations on page 6 (F, G, H).

Complete column v

- Decide your desired % calved by weeks 3, 6 and 9 and record here.

Calculate the three gaps in column vi

- These are the differences between your desired % calved by weeks 3, 6 and 9 and those for your herd.

- It is possible to have a negative gap. This means that more cows had calved/will calve by that stage than you desire. Where this occurrs, ensure that the gap is recorded with a negative sign.

Table 3:

	Column iv My herd	Column v Desired	Column vi Gap (v – iv)	
% calved by week 3	..................%..(F)	.................% (61% is achievable)	_____ %	(I)
% calved by week 6	..................%..(G)	.................% (94% is achievable)	_____ %	(J)
% calved by week 9	..................%..(H)	.................% (100% is achievable)	_____ %	(K)

Step 3) Assess the benefits

Closing the calving pattern gaps can improve herd reproductive performance. Less spread calving can also change milk income.

Part 1: Estimate the likely effect of closing the gaps on herd reproductive performance

First calculate the approximate increase in 6-week in-calf rate by fully closing the calving pattern gaps identified in Step 2:

Gaps (from Table 3, page 7)

(J) [ ] % calved by week 6 gap   X 0.17 =   [ ] (L)

(K) [ ] % calved by week 9 gap   X 0.29 =   [ ] (M)

Approximate increase in 6-week in-calf rate (%) by closing gap =   [ ] (L + M = N)

Also calculate the approximate decrease in not-in-calf rate by closing the calving pattern gaps:

Gap (same as above)

(J) [ ] % calved by week 6 gap   X 0.06 =   [ ] (O)

(K) [ ] % calved by week 9 gap   X 0.11 =   [ ] (P)

Approximate decrease in not-in-calf rate (%) by closing gap =   [ ] (O + P = Q)

Note: The numbers 0.17, 0.29, 0.06 and 0.11 were calculated using data from InCalf research study herds. Do not change these numbers.

The multipliers 0.17, 0.29, 0.06 and 0.11 in the above calculations are estimates of the expected changes in 6-week in-calf rate and not-in-calf rate for a 1% change in the % calved by week 6 and the % calved by week 9. For example, we estimate that if the % calved by week 6 is increased by 10% and the % calved by week 9 is unchanged, 6-week in-calf rate will increase by 1.7% and not-in-calf rate will decrease by 0.6%.

These multipliers were based on a simple model developed using InCalf research study data. Changes in % calved by week 6 and/or % calved by week 9 were used to create the new herd calving pattern (ie the new % calved each week after both gaps were closed). The changes in 6-week in-calf rate and not-in-calf rate due to this altered calving pattern were then estimated using associations observed in InCalf research study herds. This approach was repeated with various combinations of % calved by week 6 and % calved by week 9, allowing the multipliers to be estimated.

Part 2: Determine the likely economic benefits of improved herd reproductive performance from closing the gaps*

If no calving induction will be used in future calving periods after the calving pattern gaps are closed:

(N) [＿＿＿]　% increased herd 6-week in-calf rate　X $400　= $ [＿＿＿] (R)　✍

(Q) [＿＿＿]　% decreased herd not-in-calf rate　X $570　= $ [＿＿＿] (S)

Total benefit/100 cows/year = (R) + (S)　= $ [＿＿＿] (T)

OR

If early calving induction will be used in future calving periods after the calving pattern gaps are closed:

(N) [＿＿＿]　% increased herd 6-week in-calf rate　X $290　= $ [＿＿＿] (R)　✍

(Q) [＿＿＿]　% decreased herd not-in-calf rate　X $550　= $ [＿＿＿] (S)

Total benefit/100 cows/year = (R) + (S)　= $ [＿＿＿] (T)

Note: This $ figure is a likely gross benefit, i.e. it does not include all cost increases associated with the changes to close the gaps. These increases will depend on the particular farm strategy chosen to close the gaps after exploring options. See the next step.

ⓘ Using the tool in split-calving herds

The tool is not designed for split calving herds (i.e. herds having two or three calving periods each year) where all calving periods are short (e.g. only 6 weeks). In this situation, calving is not spread so changes to calving pattern will have little effect on herd reproductive performance. In split calving herds with a short calving period (e.g. only 6 weeks) and a longer calving period (e.g. 10-12 weeks or longer) each year, the tool is very useful but should only be applied to the longer calving period. In this situation, the economic values for seasonal calving herds are probably appropriate. Select seasonal calving with or without induction as described above. The calculated economic benefit will be per 100 cows *calving in the longer calving period* each year.

ⓘ Effects on milk income and feed costs by closing the calving pattern gaps

As well as improving herd reproductive performance, closing the calving pattern gaps can affect milk income and feed costs. To estimate the effects on milk income and feed costs from closing the calving pattern gaps, you will need to estimate the likely changes in both milk income and feed costs if more cows calve earlier. These depend on a range of factors including:

– the milk payment system for your herd;
– lactation curves for early, medium, late and very late calved cows in your herd;
– changes in herd feed requirements due to more compact calving pattern;
– options available to supply extra feeds in months where required; and
– costs of extra feeds in months where required.

These factors are complex and vary from farm to farm and year to year. You may need help from a farm management adviser to explore these likely effects accurately in your situation.

---

* Based on use of standard herd figures in the InCalf economic benefits models (2004).

Step 4) Develop & implement a strategy

Work closely with your adviser to develop your own personal farm strategy to achieve these benefits.

Key issues to consider:
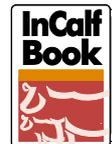
1. Strategies to close the calving pattern gaps

Strategies to close the calving pattern gaps and achieve a more compact calving pattern are summarised in *The InCalf Book* page 153. They include:

- Ensuring that a high percentage of first calvers are due to calve in the first 3 and 6 weeks of calving (page 48). If not, check heifers are meeting target liveweights. Also check bull management and AI management of the heifers.

- Maximise 3-week submission rate (page 31) and conception rate (page 32) to help achieve high 6-week in-calf rates.

- When buying animals, check that they will calve no later than week 6 and preferably by week 3 of your herd's calving pattern.

- Consider culling later calving cows. Late calving cows must be above-average producers to compensate for the reduced income resulting from later calving (pages 167-171).

- Consider whether calving induction is to be used, and, if so, plan well, creating an induction list identifying selected cows that are due to calve late (page 154).

2. Costs of closing the calving pattern gaps

Ensure you consider the costs of closing the calving pattern gaps. For example, if you plan to induce calving in more cows than previously to close the calving pattern gaps at the next calving period, be sure to consider the costs of those extra inductions. Similarly, if you plan to sell cows due to calve late and buy cows due to calve early, consider the costs of the changeover.

Also, once the calving pattern gaps have been closed, feed costs may increase. To estimate the effects on feed costs from closing the calving pattern gaps, you will need to estimate the likely changes in feed costs if more cows calve earlier. These depend on a range of factors including:

- changes in herd feed requirements due to more compact calving pattern;
- options available to supply extra feeds in months where required; and
- costs of extra feeds in months where required.

These factors are complex and vary from farm to farm and year to year. You may need help from a farm management adviser to explore these likely effects accurately in your situation.

Appendix

Planned start of calving calculator

- You will need the previous mating start date to do this.

- Either look up a breeding table (on wall charts or in some diaries) or use the planned start of calving calculator below:

  1) Start by selecting the mating start date used for the cows last year.

  2) Write the date that you started mating in box (a).

  3) Move on exactly ninth months after that month and write this date in box (b).

  4) Add 8 days to that date and write in box (c).

  This is the planned start of calving (PSC) date for your herd.

	Example	Your Herd		
Mating Start Date last year:	1 November		(a)	✍
Move on 9 months:	1 August		(b)	
Add 8 days:	9 August		(c)	

This is the planned start of
calving date for your herd