



DAIRY HERD FERTILITY

CHALLENGE NOTE 1B - Evaluating Dairy Herd Fertility Performance

Target fertility performance is generally accepted as the production of one calf per cow per year, i.e. a calving interval of 365 days. This requires the average cow to be back in-calf within 85 days of calving, which is difficult to achieve in practice due to increasing milk yields and declining cow fertility. While calving index has been traditionally used to measure fertility performance in dairy herds it does have weaknesses. This Challenge Note will introduce new methods of assessing dairy herd fertility performance and give targets for different types of calving pattern.

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Why Evaluate Fertility Performance?

The fertility performance of a dairy herd should be assessed so that it can be compared between years and with other herds. Calving index is widely recognised as a primary measure of fertility and is the average interval between successive calvings for a herd of cows. The calving index is influenced by secondary measures of fertility as seen in Figure 1.

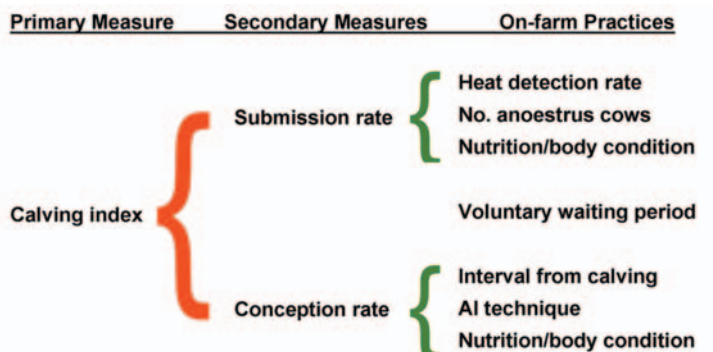


Figure 1: Secondary measures and on-farm practices which influence calving index.

Calving index is commonly quoted by milk recording agencies and computerised herd-recording packages for the assessment of fertility performance. Recently published figures for Northern Ireland dairy herds are shown in Table 1.

Table 1: Calving index of dairy herds in Northern Ireland

	Calving index	Herd range
ARINI	406	372-447
United Dairy Farmers	399	365-445

While widely used, calving index is not an ideal measure of fertility performance as it does not take account cows that are culled, especially those culled for infertility, which would extend the calving index significantly if they were to be persistently re-bred and eventually calve again. This is highlighted in Table 2, where based on calving index alone we would assume that Herd A has the best fertility performance although this is achieved by an extremely high culling rate. The economic cost of an extended calving index versus high culling rate are discussed in Challenge Note A: **Extra profit from improved dairy herd fertility.**

Table 2: Calving interval and fertility performance in two dairy herds

	Herd A	Herd B
Calving index (days)	370	390
Culled not-in-calf (%)	15	5

What are the Alternatives to Calving Index?

Researchers at the Agricultural Research Institute at Hillsborough and in Australia recognised that calving index is not an ideal measure for assessing herd fertility performance and have developed alternative methods for assessing fertility performance. These are:

- 1) In-calf rate;
- 2) Re-appearance rate.

In-calf Rate

This is a short-term measure of assessing fertility performance developed in Australia. It takes account of both submission rate and conception rate in cows intended for re-breeding. It therefore requires information on services and pregnancy diagnosis as well as calving date, but this means that it can be measured during the breeding season rather than having to wait for all cows to calve again.

In-calf rate includes all cows that are intended for re-breeding and takes account of reproductive loss in cows intended for re-breeding but never seen on heat as well as cows that are persistently served but never go in calf. Cows which are identified for culling at the start of the breeding season for being too old, having poor production, having high somatic cell counts/mastitis, lameness, etc. are not counted and so do not effect the in-calf rate.

In-calf rate can be measured in different ways depending on the calving pattern as seen in Figure 2.

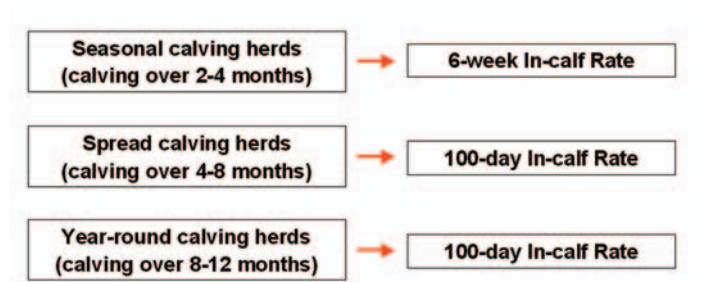


Figure 2: Assessment of in-calf rate in herds with different calving patterns

In compact seasonal calving herds with a clearly defined start date to the breeding season, in-calf rate can be assessed as the proportion of cows intended for re-breeding that are in-calf 6 weeks later. In most Northern Ireland dairy herds, calving and breeding both occur over a 4-8 month period so use of 100-day in-calf rate is more appropriate, i.e. the proportion of cows intended for breeding that are back in-calf within 100 days of calving.

The fertility study conducted by ARINI found that only 46% of cows intended for re-breeding were back in calf within 100 days of calving, but this ranged from 16-71% between herds. Again, the highest rates were attained in seasonal compact-calving herds, which had lower intervals to first service and higher heat detection rates.

Re-appearance Rate

Since the general aim is for each dairy cow to calve once each every 365 days, researchers at ARINI looked at the proportion of cows calving again within this time. Just as with calving index, re-appearance rate uses basic information on calving dates and assesses the proportion of cows that calve again within a period of 365 or 400 days.

In the ARINI study, only 23% of cows calved again within 365 days (365-day re-appearance rate), but considerably more cows calved during the following month - 44% of cows calved again within 400 days (400-day re-appearance rate). This is seen in Figure 3, which indicates that approximately 75% of cows eventually calve again/re-appear, with the remaining 25% being culled.

While the average 400-day re-appearance rate was 44%, this ranged from 22-65% between herds, with the highest rates being attained in seasonal compact-calving herds that had lower intervals to first service and higher heat detection rates. The target 400-day re-appearance rate, based on the average of the 5 top-performing herds is 60%.

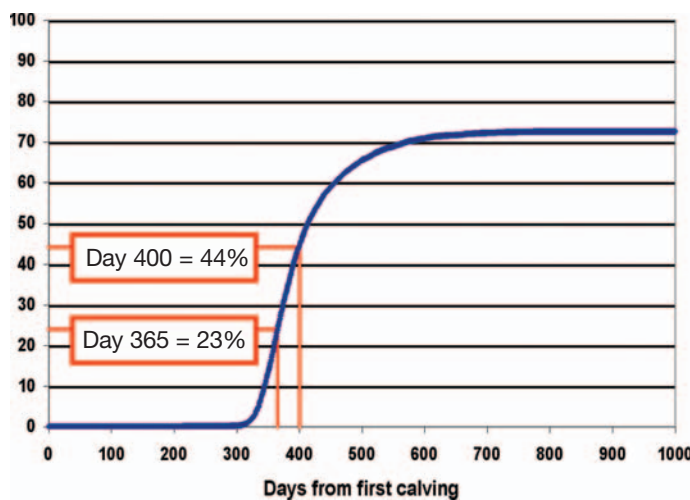


Figure 3: Proportion of cows which calve again (re-appearance rate) at a range of intervals from the previous calving (Source: ARINI).

Re-appearance rate is a much better long-term measure of fertility performance than calving index. However, it can be difficult to calculate without the use of a computer but could be provided by milk recording agencies and computer software herd management as an alternative to calving index.

As indicated in Figure 4, re-appearance rate is a better measure of fertility than calving index, but the long-term nature of it means that it is too historical to have any impact during the current breeding season, unlike in-calf rate.

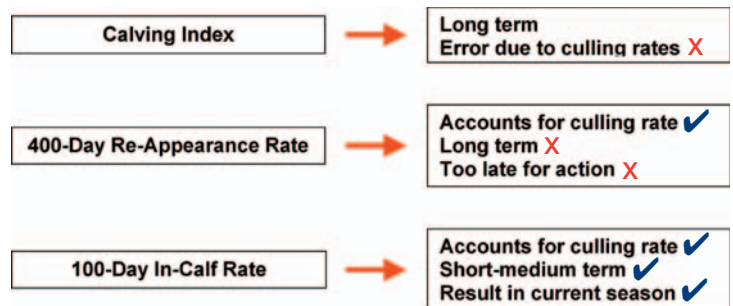


Figure 4: Advantages and disadvantages of the alternative measures of fertility performance

Target Fertility Performance

It is recommended that calving index should be replaced with in-calf rate or re-appearance rate as the primary measure of fertility in Northern Ireland dairy herds. These measures should be adopted by dairy farmers and the wider dairy industry, with the targets indicated in Table 3.

Table 3: Targets for fertility performance in Northern Ireland dairy herds.

	Target
6-week/100-day in-calf rate	65%
400-day re-appearance rate	60%

Summary

- Calving index is the traditionally used measure of dairy herd fertility performance, but culling rate has a major effect on it.
- In-calf rate and re-appearance rate should be adopted by the industry as alternative methods of assessing overall fertility performance.
- In-calf rate should be used as a short-term measure of fertility performance during the breeding season to provide an early indication of fertility performance.
- Re-appearance rate should be used to replace calving index as a long-term measure for assessing fertility.