

Measuring success: KPIs for monitoring – and improving – herd fertility. [Page 24](#)

Fertility index: herd reproductive performance has improved during the past 12 years. [Page 26](#)



Practical pointers to help measure true herd fertility

Real-time reproductive performance



What should UK producers be measuring to keep track of herd fertility? Three fertility experts, all speakers at the recent TotalDairy conference in Staffordshire, tell us more.

text **Rachael Porter**

Think of fertility and we think of calving interval, days in milk, conception rate to first service, pregnancy rate. There's quite a list to choose from. Little wonder, then, that it can be a bit of minefield when it comes to measuring monitoring fertility. And, with so much data and different figures out there, which ones should producers be basing fertility management decisions around?

US-based dairy specialist Paul Fricke, from the University of Wisconsin-

Madison, cuts to the chase. "None of the above. Not if you want to know what's happening with now and base decisions on 'real time' information."

He explains that calving interval, for example, suffers from something he and many other fertility experts call 'lag'. "Calving interval tells you what was happening with herd fertility nine months ago – it doesn't give you a picture of what's happening today. To do that, the best tool is the 21-day pregnancy rate. But that's not without its problems," he says.

As a tool, it works extremely well in the US, with its larger and predominantly all-year-round calving herds. And most of these herds are using computerised management systems, so the calculations, which can be complicated, are done automatically.

Fertility efficiency

"Basically, you're looking for a 21-day pregnancy rate of between 25% and 30%," says Dr Fricke. But what, exactly, is the 21-day pregnancy rate, which is better known in the UK as the herd's fertility efficiency – and what is it measuring?

If you take the number of cows that are eligible to be served in a 21-day period, it's the actual percentage that get pregnant," explains the University of Nottingham's John Remnant.

So if, for example, you have 100 cows that are eligible for service in a given



three-week period, you'd hope to see at least 50% in heat and, of that 50 cows you then observe in heat and serve, you'd expect slightly less than half to actually hold to service. So just less than a quarter of the 100 cows.

Typically, in practical situations, the 21-day pregnancy rate would be around 15%, so 20% is good in an all-year-round calving herd – it's something to aim for, if you're not already there."

But there is a problem with this measurement, as a monitoring tool in UK herds. Many are seasonal calving and this still works in block calving herd, but you have to start the three-week period from the first day of breeding. Also, in order for this data to be meaningful, herd size really has to be above 200 cows. The average herd size in the UK is still well below that.

If you only had three cows eligible to get back in calf for a particular 21-day

period, your 21-day rate is either going to be zero (no cows in calf), 33% (one cow in calf), 66% (two cows), or 100% (all three).

Mr Remnant suggests another option for herds with fewer than 200 cows, which might be more realistic, is to look at submission rate (proportion of eligible cows served) and conception rate (proportion of cows served becoming pregnant) over a longer period of time. "We'd aim for the submission rate to be more than 50% and conception rate more than 40%.

"But be aware that there's still some 'lag', depending on how long it takes to have enough eligible cows for the numbers to be meaningful."

Another useful metric in small herds is the 'pregnancy hard count. "This is where you set a target number of pregnancies per week, per fortnight or per month. As a rough guide to achieve a 365-day calving index, you'd divide the herd size by 12 to calculate the number of cows that should get in calf each month."

KPI options

Choosing the correct key performance indicators (KPIs) to track herd fertility was the topic discussed with delegates at the event by Miel Hostens, from the Belgian Ghent University.

"With so many herd management software packages on the market and a huge range of data at producer's finger tips, it can be difficult to 'see the wood from the trees' and decide which KPI to look at," he says.

Dr Hostens is also a great advocate of the 21-day pregnancy rate. "But, as with other parameters like calving interval and conception rate to first service, it has its pitfalls. Yes, there's no 'lag', but it's much more suited to monitoring fertility in large herds with all-year-round calving patterns."

He believes that days in milk (DIM) is one of the easiest and most effective KPIs

to monitor and should be viewed as a herd's 'engine rev count'. "It will tell you if the engine is turning at a smooth rate and working at its optimum.

"And unlike calving interval, there are limited ways in which it can be calculated and this means that the figures are less prone to the vagaries of different management systems. A low average-days-in-milk figure shows that a herd has good fertility.

True comparisons

"Around 160 days in milk should be the average herd target for all-year-round calving herds. For seasonal and block-calved herds this will vary considerably."

Dr Hostens also urges producers to be aware of how KPIs are calculated.

"There's not an issue with this in the US – where 80% of cows are monitored and managed using the same software package from one company. I'm not aware that such a monopoly exists in the UK or the EU. But it's always worth being aware that some measurement may be 'wrong' or incomparable with those on other units. Benchmarking is a good thing – but make sure you're making true comparisons.

And he stresses not to get too hung up on figures – particularly those with 'lag'. "Focus on now and visualise what's going on in your herd. Using visualising tools, such as a Bray breeding board, can really help.

"The human brain finds it much easier to assess things visually compared to using measurements. You can also take regular 'snap shots', perhaps by adopting the 21-day pregnancy rate if it works for your herd and system.

"Otherwise, concentrate on monitoring for signs of heat, improving your submission rate and conception rate to first service.

"And sit down regularly, ideally with your vet or consultant, and interpret that data and what it means for your herd and business." |

Key fertility performance indicators

21-day pregnancy rate:

the percentage of cows, eligible for service in a given 21-day period, who actually get back in calf. Aiming for 20% is the ideal.

Pregnancy hard count:

a target number of pregnancies is set per week, fortnight or month.

Total submission rate:

this should be at 50% or higher to indicate strong cycling and heat detection, in other words good fertility.

Days in milk (DIM):

the target herd average, to indicate good fertility, should be around 160 days.

Fertility tool has reduced the UK herd's average calving interval

Breeding index puts fertility back on track

It's been 12 years since a daughter fertility index was introduced, allowing producers to select for production, conformation and fertility. We spoke to a leading geneticist to find out what impact it has had on fertility in the UK herd.

text **Rachael Porter**

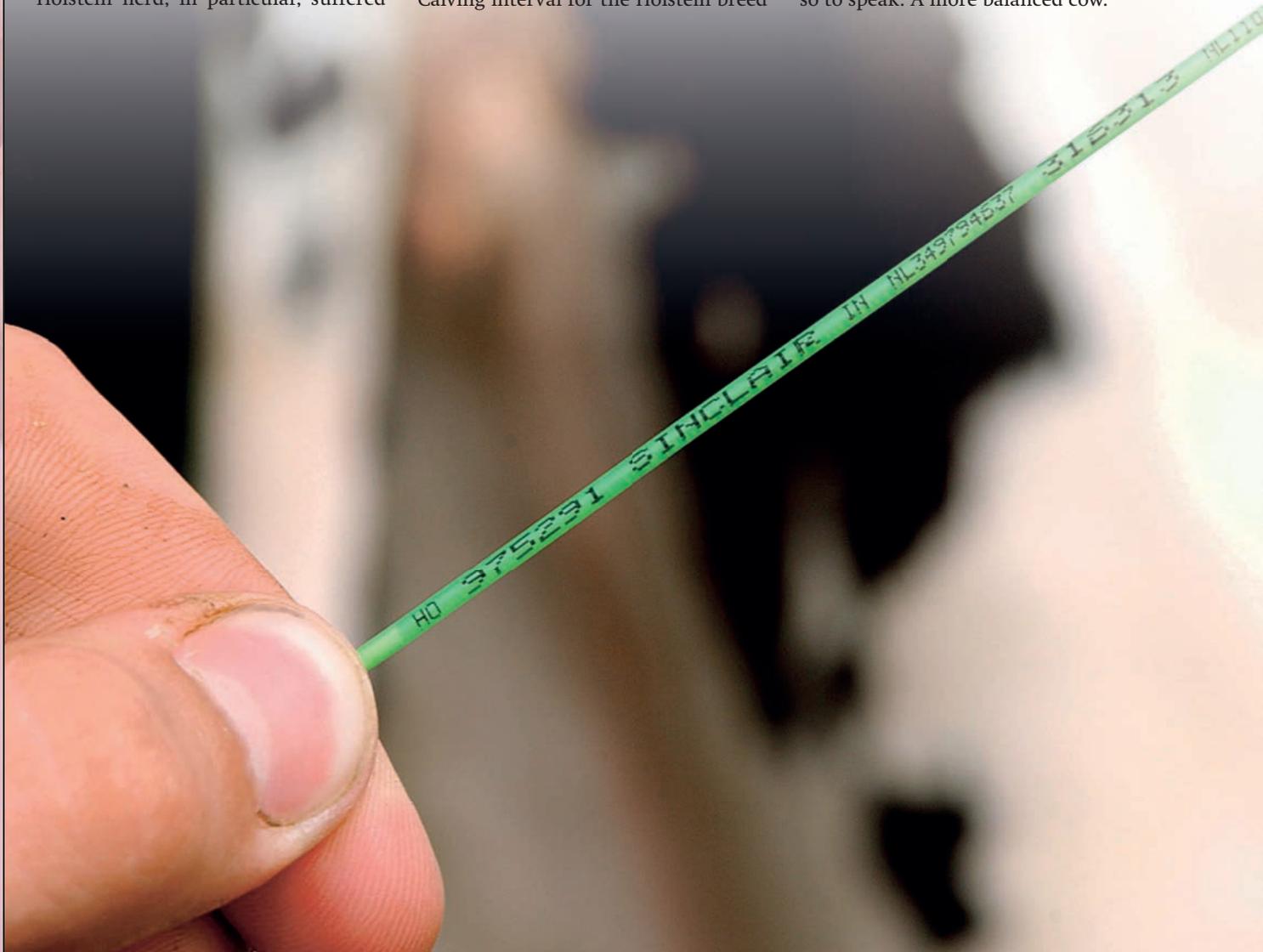
Up until 2005, producers had no information to make meaningful decisions in relation to fertility and breeding largely focused on yield and conformation. As a result, the UK's Holstein herd, in particular, suffered

a significant decline in fertility. And not least because high milk yields are negatively correlated with fertility. The higher the yield, the more difficult it can be to get a cow back in calf. Calving interval for the Holstein breed

peaked at 428 days in 2008/2009, following a progressive reduction in fertility starting in the mid 1980s when breeders began pushing for milk yield.

Selection tool

"We recognised this trend but we didn't have the data or the technology to begin developing a tool to help producers select for fertility until 2000," says AHDB Dairy's head of animal genetics Marco Winters. "Finally, in 2005, we introduced a fertility index, which allowed producers to select sires that offered good production, conformation and daughter fertility. The full package, so to speak. A more balanced cow.





Marco Winters: "Bulls with poor fertility have limited, or no, value in the UK"

"Since 2005 the fertility index of bulls has seen massive improvements, and this has been achieved without a significant compromise in the rate of gains in production – you have to take a hit somewhere. But it is possible to select sires with positive scores for milk and fertility and make improvements."

Figure 1 shows the average genetic merit of insemination, recorded by milk recording organisations. So this is a weighted average of all the sires used by year of insemination. The average milk PTAs have been plotted against the average calving interval – one of the two components of the fertility index, the other being non-return rate. And, as a rough guide, each fertility index point is equivalent, genetically, to a calving index improvement of around 0.6 days. Today the UK herd's average calving interval for Holsteins has fallen to less than 410 days and still improving.

Production potential

"You can see how, up until 2005, the widening calving interval was tracking the genetics of milk-yield increase in the UK herd. But since 2005 producers have been selecting sires, for use on their herds, that offer good fertility, as well as high production."

The fertility of bulls in use today is similar to that of those used in the early 1990s,

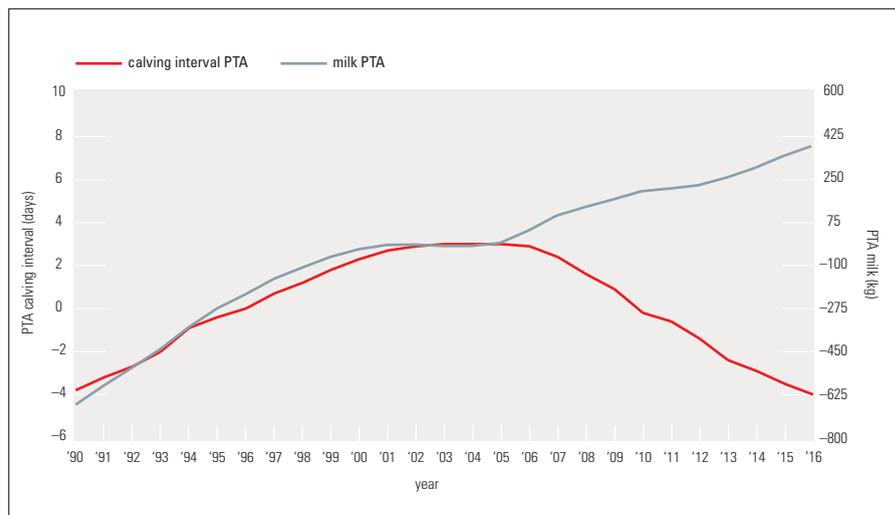


Figure 1: The average genetic merit of sires used in the UK since 1990 (source: AHDB Dairy)

but with significantly higher production potential. The average genetic merit of cows, by year of birth, has also improved since 2005 due to improved sire selection. But there is an obvious time lag between improved sire selection and the effect this has on the milking herd.

"This is partly due to the lag between insemination and the progeny coming into the herd, but also because the dams of these heifers have not been heavily selected on fertility yet – unlike with sires," explains Mr Winters. "In fact, there is some indication that the heifers selected to breed replacements from aren't always the most fertile animals. This may be because producers tend to favour the higher production heifers. That said, we can also see that the animals that remain in the herd for three lactations or more have better fertility than their contemporaries."

The average fertility index of bulls used today is more than 10 points higher than it was in 2005, at +6, indicating that bulls with poor fertility have limited, or no, value in the UK market anymore. "That's as it should be," adds Mr Winters.

"Breed differences still exist and that's

why cross breeding became popular a decade ago – particularly when Holstein sires that offered good fertility were not available. When the genetic information on fertility was limited, the only viable option at the time was to use bulls from a breed that was known to have better fertility. But this fertility 'benefit' had to be off-set against a loss in production potential."

Fertility comparisons

Today the information available on sire fertility has vastly improved and not only can producers select the best bulls for fertility within each breed, but they can also select the best across breeds (see Table 1). "The UK's spring calving index ranking makes it possible to make direct fertility comparisons for individual bulls," says Mr Winters.

He adds that the British Friesian has an obvious advantage when it comes to fertility: "But bulls from other breeds – including Jersey and Holstein – can compete in the top 10 fertility sires available in the UK today."

Fertility is linked to health, nutrition and lifetime production. So looking at other parameters indirectly improves fertility.

"The longevity index also has a positive impact on fertility," says Mr Winters. "Fertility is key to longevity – a cow won't last in the herd if she can't get back in calf easily. So by selecting for longevity you are, in effect, selecting for both traits."

He adds that the addition of more breeding indexes will, indirectly, also help to improve fertility. "A lameness index, which will help to reduce lameness and improve fertility, is set to be rolled out in early 2018." |

Table 1: Top 10 fertility index bulls available in the UK, ranked in top 300 £SCI (source: AHDB Dairy)

bull name	£SCI ranking	£SCI	breed	fertility index
College Hereward	192	256	British Friesian	20.4
VR Gunnarstorp Backen Gobel	33	353	Swedish Red	17.4
Danish VJ Hilario	3	485	Jersey	17.2
Catlane Caleb	8	426	British Friesian	16.5
Catlane Cromwell	99	294	British Friesian	16.3
Danish VJ Herodot	12	409	Jersey	15.8
VH Cole Clark	15	405	Holstein	15.8
Danish DJ Holmer	18	396	Jersey	14.6
Cookiecutter Petron Halogen	144	270	Holstein	14.5
Gopollen	217	250	Norwegian Red	14.5