Mating Starts Now

Scott McDougall, Anexa Animal Health

Key points

- Excellent reproductive performance is achievable, no matter what farm system you're running and what area of the country you're in.
- Good reproductive performance requires clear goals and a year-round commitment.
- There are no silver bullets; in most situations underperformance is due to not meeting targets for one of the eight factors that drive reproductive performance.
- The largest factor determining reproductive success is the reproductive performance of the previous season, that is, calving spread has a major impact on subsequent fertility.

Introduction

What are the key factors for good fertility?

Eight key factors have been identified in studies in Australia and New Zealand for reproductive performance:

- Calving pattern.
- Heifer management.
- Cow health.
- Body condition score and nutrition.
- Heat detection.
- Dealing with non-cyclers.
- Genetics and AI practices.
- Bull management.

So where a herd is not meeting targets, the reason why will almost certainly be due to one of the eight factors listed above.

What's the goal?

Like anything in life, if there are no directions or goals then one won't reach any particular place.

So the first step in improving reproductive performance is to have goals and then assess the current state of play on your farm.

The InCalf program suggests some high-level targets; a 78% six-week in calf rate and a 6% not in calf rate after 12 weeks of mating. These targets are based on the performance of the top 25% of herds. Economic modelling shows that there is an economic return in achieving these targets. For each 1% increase in the six-week in calf rate there is a return of about $400/100 cows and for each 1% reduction in the not in calf rate there is a return of $1,000/100 cows. There are additional benefits to good reproductive performance, including potentially shorter calving and mating periods, greater choice in terms of culling and so greater ability to get rid of low producers, high cell count cows, etc.

Set challenging but realistic goals. If the current performance of your herd is, for example, a 60% six-week in calf rate, setting a goal of 78% for next season may be setting yourself up for failure. So it may be better to set goals to improve over a number of years. For example, a 5% increase in six-week in calf rate/year over three years is challenging but achievable.

Where are we now?

The fertility focus report is a great place to get a snapshot of the current performance of the herd. This report summarises the overall herd performance, the drivers of the six-week in calf rate including submission and conception (or non-return) rate, and indicates the key areas for improvement, such as calving spread and heat detection. The quality of this report is dependent on the timing and type of pregnancy testing undertaken. To get really good quality data, the whole herd should be dated pregnancy tested.

Currently, the average herd in New Zealand is achieving six-week in calf rates of about 66%, a 3-week submission rate of about 80% and a conception rate to first service of a little under 50% (Table 1). However, there is enormous variation between herds in reproductive performance, with a range of six-week in calf rates from under 50% to over 80% (Figure 1).

Cows not cycling pre breeding (%)	10
3-week submission rate (%)	79
Conception rate to 1st service (%)	47
6-week in-calf rate (%)	66
Total length of mating period (wk)	14
Empty rate (%)	10

Table 1. Reproductive performance of New Zealand dairy herds based on large-scale surveys (Xu and Burton 2003; Brownlie et. al. 2013).

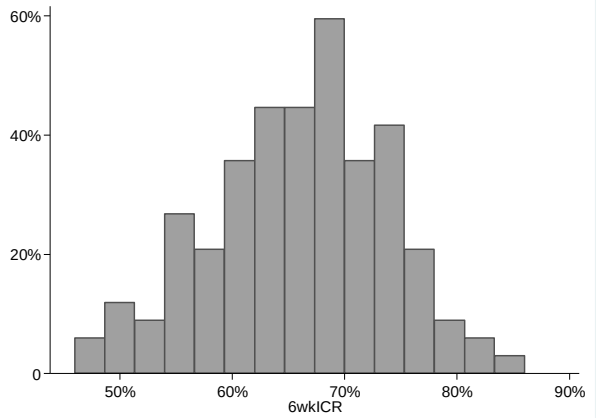

Figure 1. Six-week in calf rate from 126 herds enrolled in the national herd fertility study (Brownlie et. al. 2013).

What next?

Having set your goals and assessed the current performance, we need then to identify which areas could be improved (Figure 2). This involves taking a holistic view of the farm system. So, for example, there is no benefit in spending a lot of time and money on changing the semen source if the underlying problem in the herd is poor rearing and poor calving pattern of the heifers. So take time to identify which of the eight factors listed above offer the greatest room for improvement. The options for change should then be considered. So, for example, if heat detection appears to be an issue, options might include: additional staff training, undertaking paddock checks, or use of additional heat detection aids. The next step is to get on and implement these changes. Use of SMART (specific, measurable, achievable, realistic and time bound) goals will increase the chance that the change will actually be implemented. Finally, we need to assess whether the change in

management has actually improved reproductive performance. At the minimum have a look at the fertility focus report after the subsequent breeding season.

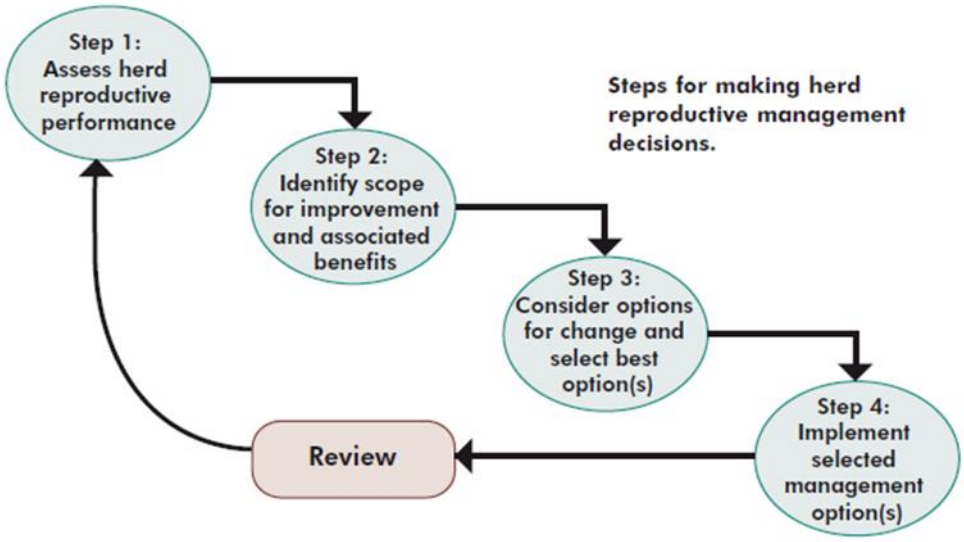

Figure 2. The continuous improvement process for reproduction management.

Managing calving to optimise fertility

The transition from the dry period to lactation is a major event in a cow's life. There are large metabolic demands on the cow as she starts producing milk and the highest risk of disease is in the few weeks following calving. This is at least partly due to the fact that cows go into a period of negative energy balance where their energy intakes are not sufficient to meet the requirements of lactation. The calving period is associated with poorer immunity, due to fewer white cells being in the bloodstream and a reduced ability of these immune cells to kill bacteria.

Calving cows and heifers with a body condition score (BCS) of between 5 and 5½ is important to optimise production and reproduction. Animals calving with too high a condition score are prone to excessive loss of body condition score after calving, with negative effects on health. Conversely those that are too light are likely to have an extended non-cycling period and not achieve optimal production. It is hard to measure the body condition score of cows in the last month before calving. So animals should be set up in optimal body condition score well before calving.

The great majority of animals will lose some body condition after calving. The aim is to manage this loss to less than one unit. So feed budgets should be set up and animals monitored on a regular basis to ensure that BCS losses are not excessive. Excessive BCS loss results in mobilisation of excessive amounts of body fat, with potential negative effects on health and fertility. Measurement of one of the downstream products of fat breakdown, beta-hydroxybutyrate (BHBA), is an additional tool to monitor cows after calving. There is a large variation between herds and across time within herds in the proportion of cows that have elevated concentrations of BHBA. There is also emerging evidence that elevated BHBA is associated with increased risk of uterine disease and poorer reproductive performance. Cows with a high BHBA (>1.2 mmol per litre) were almost 3 times more likely to be Metricheck positive and had a 7% lower six-week in calf rate, than herd mates with lower BHBA (Table 2).

Measure of BHBA	Status	Outcome	Estimate (%)			Estimated difference (%)		
			Mean	LCL	UCL	Mean	LCL	UCL
BHBA ≥1.2 mmol/L <5 days post-calving?	No	Metricheck +ve	5.4	2.8	9.3			
	Yes		14.6	5.8	27.0	9.5	1.3	22.0
BHBA ≥1.2 mmol/L within 5 weeks post-calving?	No	6 week in calf rate	88.5	83.0	92.6			
	Yes		81.4	76.7	85.6	-7.2	-1.9	-12.7

Table 2. Prevalence of Metricheck positive cows 5 weeks post-calving and 6 week in-calf rate in cows with high (> 1.2 mmol/L) or normal concentrations of beta-hydroxybutyrate (BHBA, Compton et al 2015). (LCL and UCL are the lower and upper 95% confidence intervals, respectively).

Where there are significant deficits in the feed budget after calving, these should be filled with the cheapest available energy source. Recent research has shown that feeding high soluble carbohydrate feeds (for example, maize or barley grain), may increase production, but appears not to affect the rate of body condition score loss and to not improve reproductive performance.

The aim is to minimise disease around calving. It is important to record all cases of disease, firstly, to understand how much disease is occurring and secondly, to allow targeted treatment of affected cows. There should be less than 2% of cows with milk fever and less than 5% of cows with mastitis in the first month after calving. If these targets are exceeded then close examination of how the cows are managed through the calving period is important.

Picking up calves twice a day reduces the risk of clinical mastitis in their dams by over 40%. It is not quite clear why this occurs, but it is a significant effect. Use of teat sealants in both heifers and cows reduces clinical mastitis in early lactation, with the benefit of also reducing bulk milk somatic cell count. It is also now becoming clear that cows with mastitis have poorer reproductive performance. So reducing mastitis not only has direct benefits in terms of animal welfare and milk quality, but also will improve reproductive performance.

Uterine disease reduces the 6-week in calf rate. Identification (e.g. Metrichecking) and treatment of these animals results in better outcomes, with treated cows conceiving 1 to 2 weeks earlier than those not treated.

What about non-cycling cows?

Cows not cycling by the start of mating have lower submission, conception, and pregnancy rates than herd mates cycling by that time.

The major reasons that cows are not cycling include: late calving, being a heifer, being a Friesian, having some kind of disease around calving (e.g. mastitis or uterine disease) and having a low body condition score. So management before and after calving will impact on how many non-cyclers are in a herd.

There are many approaches to dealing with non-cyclers including: doing nothing at all, once a day milking, use of teaser bulls or use of hormonal treatments. Given time, most animals will resume cycling. So, for example, between 50% and 60% of cows that have not been detected in oestrus by the start of mating will cycle of their own accord in the subsequent 3 to 4 weeks. So it may be

tempting to say that cows simply require more time and to not do anything. The problem here is that in seasonal calving systems each day later a cow conceives will result in calving occurring a day later in the subsequent year, with a resultant loss of production and increased risk of being a non-cycler next year. Putting cows onto once-a-day milking a week before the start of mating will increase the submission rate compared to leaving cows on twice a day by about 10-15%. However, depending on breed, there will be a 10 - 15% loss of production from these animals during the period that they are once-a-day. So the economics of this approach may be negative. Strategic use of once-a-day milking from early lactation in situations where feed deficits are present is another strategy that may reduce the risk of non-cycling. Again the economics are not entirely clear.

In lactating beef animals there is evidence that using teaser bulls will reduce the period of non-cycling after calving. However, evidence for this effect in dairy cows is not present. One study in the South island did find an increased submission rate with use of bulls, but this was most likely associated with more cows being detected, rather than more cows cycling.

Non-cycler treatment programs including progesterone, GnRH and PG, result in non-cycling cows conceiving about 10 to 15 days earlier than their untreated herd mates (Figure 3). Economic analysis suggests that this is cost-effective even with relatively low payouts. It should be noted that while these treatments do get cows in calf more quickly, they have a limited effect on the six-week in calf rate and empty rate. The benefits are due to more days in milk in the subsequent year, more AI calves and a reduced risk of being non-cycling in the subsequent season.

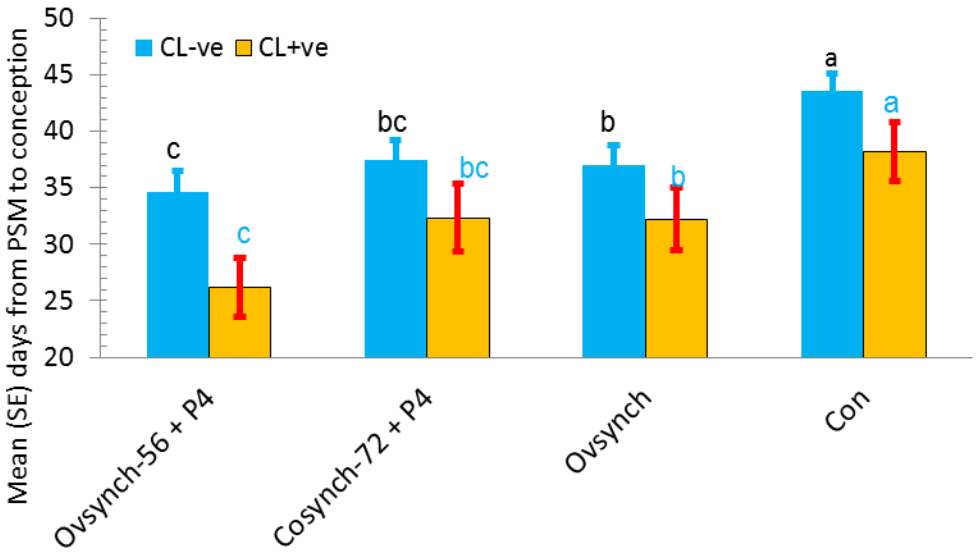

Figure 3. The mean (standard error) interval (days) from the planned start mating (PSM) to conception for noncycling cows that were treated with progesterone (P4), GnRH and PG with AI about 12 to 20 hours after the final GnRH injection (Ovsynch-56 + P4); the same program, but with the final GnRH delayed until 3 days after progesterone device removal and insemination at the time of GnRH (Cosynch-72+ P4); a combination of GnRH, PG, GnRH at 7 and 2 days intervals, respectively, with insemination 12 to 20 hours after the final GnRH (Ovsynch); or left as untreated controls (Con). These cows had been presented as non-cycling cows by herd owners and had been scanned to determine whether ovulation had commenced as indicated by the presence of a corpus luteum or yellow body (CL +ve). Columns with different initials above them are different at P <0.05. (Data from McDougall 2010).

Conclusions

Excellent reproductive performance can be achieved under New Zealand management systems across different farm systems and across different regions of the country.

Good planning, management and monitoring of herd fertility are required to achieve good results.

Management of the previous breeding season and decisions around drying off (e.g. to ensure optimal body condition score), have a large impact on the next calving period and hence on subsequent reproductive performance.

The transition period is critical for cows as this is a period of high risk of disease with subsequent potential negative impacts on reproduction. So managing the transition to minimise cow disease and to quickly detect and correct disease problems is important.

Prevention of disease is important, but some animals will develop uterine disease or fail to start cycling by the start of the breeding program. There are now interventions which have been demonstrated in controlled randomised studies to improve fertility for these cows.