

TechNote 20

Achieve reproduction targets

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Farm management plays the most significant role in overall herd reproductive performance. Nutrition plays an important role in reproductive performance; however, it is only one of many ingredients needed for the perfect recipe.

Other ingredients include:

- genetics and breeding practices
- calving pattern,
- heifer management,
- heat detection,
- cow health
- bull management,

For more information on how to improve herd reproductive performance see the DairyNZ InCalf programme. The InCalf programme takes an integrated approach to herd reproduction and is a learning package of tools, resources and training for both dairy farmers and their advisors.



For more details see DairyNZ InCalf resource: dairynz.co.nz/animal/reproduction/incalf

20.1 Achieve body condition score targets at calving

Of the nutritional factors, body condition score (BCS), and in particular BCS at calving, has potentially the biggest influence on reproduction. Recommendations are that cows calve at BCS 5.0 and be BCS 4.0 at planned start of mating, while heifers and second calvers should calve at 5.5 and be BCS 4.5 at planned start of mating. Cows that calve below BCS targets take longer to start cycling after calving and are more likely to be inseminated at their first cycle. Conception rate increases with each cycle (7-8% increase in conception rates at second vs first cycle), therefore cows below BCS targets at calving are more likely to have a lower conception rate.

Cows that are above target BCS at calving have a greater risk of metabolic disorders post-calving which can reduce reproductive performance. Thus ensuring all cows are at BCS targets at calving is important.

Once calved, it is very difficult to alter BCS change. Increasing feed allocation (pasture or supplements) does not impact on BCS loss until after 4 – 5 weeks of lactation. The main determinant of BCS loss after calving is BCS at calving, which is primarily influenced by feed and cow management in late lactation and during the dry and transition periods.

Key strategies to achieve target BCS at calving are covered in detail in TechNotes 27 and 29. Reaching BCS targets at calving and correct management of cows during the transition period and early lactation should ensure cows are at target BCS at planned start of mating.



For more details see TechNotes 12: Feed the transition cow appropriately, 16: Determine energy requirements, 27: Measure and monitor body condition score, and 29: Achieve body condition score targets at calving.

20.2 Avoid underfeeding cows prior to mating

If cow intakes are restricted immediately prior to, or during, the mating period then reproductive performance can be reduced. This can be due to a feed deficit (residuals less than 1500 kg DM) or prolonged adverse weather and poor pasture utilisation and intake. The impact of a severe feed deficit (intake at 55% of feed requirements for three weeks at the start of the mating period) on reproductive performance is outlined in Table 1.

In this experiment, cows were at target BCS prior to the feed restriction and no heifers were included. On commercial farms results could be worse, especially during adverse conditions and when younger and/or thinner animals are included.

Table 1. Reproductive results from cows fed either target or restricted intakes for three weeks at planned start of mating (Burke et al., 2010).

Overall result (%)	Target intake (16 kg DM/cow)	Restricted intake (8 kg DM/cow)	Difference
3-wk submission rate	92	88	*
Conception rate to first insemination	52	47	
6-wk in-calf rate	78	71	**
Not-in-calf rate	6	7	

*Difference is a trend (P<0.10)

**Difference is statistically different (P<0.05)

The key is to maintain adequate intakes of high quality pasture during this period. This can be achieved by correct allocation of pasture (and supplements if necessary) and meeting grazing residual targets in the previous rotation.



For more details see TechNotes 16: Determine energy requirements, 17: Allocate spring pastures correctly, and 18: Allocate required nutrients.

If cows are at target (BCS 4.0 at planned start of mating, and residuals are at 1500 - 1600 kg DM/ha or 3.5 - 4.0 cm with good utilisation, then there is no reproductive benefit of adding supplements into the system. Feeding extra supplements will increase energy intake and, depending on management (e.g. wastage, substitution) and supplement used, may generate a milksolids response, but will not improve reproductive performance. The lack of an effect of feeding additional supplements is supported by international and New Zealand research.

Q: Are there any reproductive benefits of feeding cows supplements at mating?

A: No, not if cows are at target BCS and adequately fed on pasture.

One New Zealand trial reported no difference in reproductive performance when cows were supplemented with either 0, 3 or 6 kg DM/cow day of a high energy supplement from calving through mating. This was supported with research from Ireland that reported no improvement in reproductive performance in cows that were supplemented with 4 kg DM concentrate through the mating period compared with cows that were fed grass only.



For more details see TechNotes 10: Response to supplements, and 19: Use supplements profitably.

20.3 If feeding supplements, carbohydrate type does not matter

It had been proposed that feeding supplements high in starch or sugar, or increasing the proportion of these non-structural carbohydrates in the diet will improve reproduction. This hypothesis, the 'Garnsworthy diet' as it is sometimes called, is based on increased concentrations of circulating hormones such as insulin and IGF-I, which could lead to earlier cycling and improved reproductive performance.

However, the effect of increasing IGF-I on cycling is inconsistent and research in NZ indicates that more than 80% of the variation in 'time to first oestrus' in NZ cows is related to factors other than IGF-I levels. Additionally, high IGF-I levels post-mating can lead to embryo death.

On-farm trials were conducted to investigate the effect on reproduction of feeding the same energy from either a high-starch supplement or a high-fibre supplement. These involved 950 cows in three dairy herds.

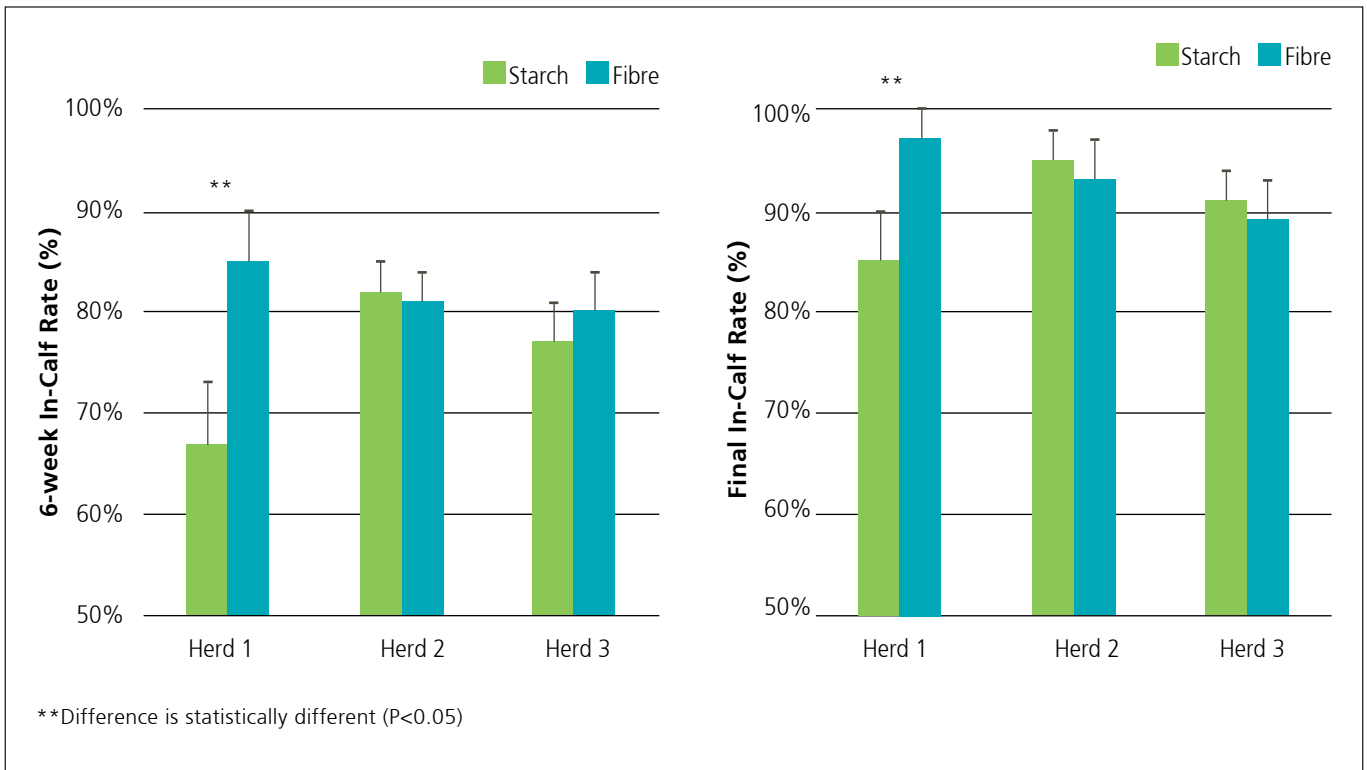
The results highlighted there was no benefit of feeding starch-based supplements compared with fibre-based feeds on any reproductive measures. There was no evidence of earlier cycling or improved submission rates. In fact, there was a risk of reduced 6-week In-Calf and Final In-Calf rates when cows consumed the high-starch diet (Figures 1a and 1b).

This trial indicates that feeding starch-based supplements to increase insulin and IGF-I has inconsistent effects on cycling and other reproductive measures between herds. Variation in reproductive responses between herds (Figures 1a and 1b) could be due to differences in base diet composition, level of supplementary feeding, substitution rate and milk production.

Q: Are there reproductive benefits from feeding a high starch supplement?

A: No, there is no benefit to reproductive performance from feeding a starch-based vs a fibre-based supplement.

Figures 1a and 1b. Variation in 6-week In-Calf Rate and Final In-Calf Rate between herds when half of the cows were fed pasture plus a starch-based supplement for 30 days post-calving (Starch), and the other half were fed pasture plus the same amount of energy from a fibre-based supplement (Fibre).



Recommendations are to feed cows adequately during this period using cost effective supplements if necessary. These supplements should be of good quality and free from spoilage. Decisions on supplement type should be based on the cost/benefit of the predicted milksolids response with no overall benefit of feeding high-starch supplements.



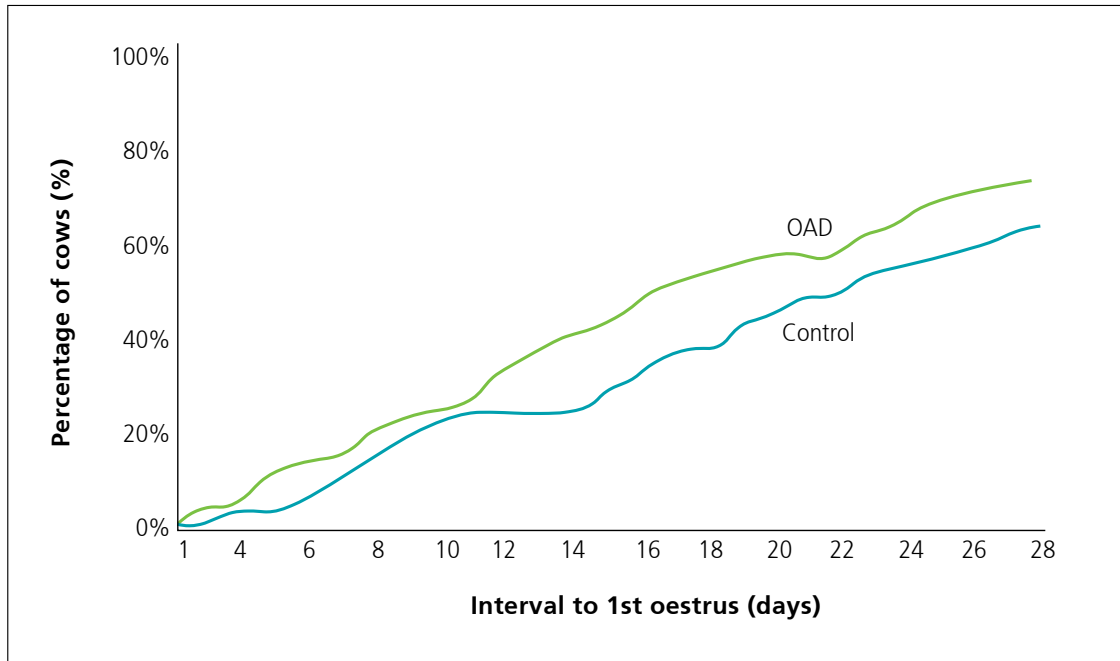
For more details see TechNotes 10: Response to supplements, and 18: Use supplements profitably.

20.4 Identify at risk cows or heifers

Cows and heifers that are below target BCS prior to mating should be identified and management strategies implemented to improve their reproductive chances. If energy balance is limiting reproduction, milking cows once a day for several weeks prior to/during mating has the potential to improve energy balance and improve reproduction. Research with anoestrus cows indicated that milking cows once a day improved the percentage of cows detected in oestrus within 28 days (Figure 2), but did not alter other reproductive variables and resulted in a 20% drop in milksolids production during the 4-week period. It must be noted that in this experiment all cows were walked to and from the shed twice daily. If cows are milked once a day, separating them from the main mob and only walking to the shed once daily, can potentially improve the benefits. This is due to less competition from older, more dominant cows, less energy and time needed for walking to and from the shed, and more time to graze.

Even if cows continue to be milked twice daily, identifying and separating any younger, thinner cows from the main herd and preferentially feeding them with good quality pasture and supplements if necessary, will remove competition from older, more dominant cows and improve energy status and BCS. This may increase the potential for successful reproduction.

Figure 2. Effect of milking anoestrus cows once daily (OAD) for 4 weeks, starting one week before planned start of mating, on interval from start of treatment to first oestrus (Rhodes et al., 1998).



20.5 Further reading

Burke, C. R., Y. J. Williams, L. Hofmann, J. K. Kay, C. V. C. Phyn, and S. Meier. 2010. Effects of an acute feed restriction at the onset of the seasonal breeding period on reproductive performance and milk production in pasture-grazed dairy cows. *Journal of Dairy Science*. 93: 1116 - 1125.

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Kolver, E. S., J. R. Roche, C. R. Burke, and P. W. Aspin. 2005. Influence of dairy cow genotype on milksolids, body condition and reproduction response to concentrate supplementation. *Proceedings of the New Zealand Society of Animal Production*. 65: 46 - 52.

McDougall, S., S. Leane, S. Butler, J. Roche, and C. Burke. 2018. Effect of altering the type of dietary carbohydrate early postpartum on reproductive performance and milk production in pasture-grazed dairy cows. *Journal of Dairy Science*. 101: 3433 - 3446.

Roche, J. R., C. R. Burke, S. Meier, and C. G. Walker. 2011. Nutrition x reproduction interaction in pasture-based systems: is nutrition a factor in reproductive failure? *Animal Production Science*. 51: 1045 - 1066.

The InCalf Book for NZ Dairy Farmers. <https://www.dairynz.co.nz/animal/reproduction/incalf/>