Reproduction and Mating of Dairy Cows
30 Oct 2004

REPRODUCTION AND MATING

A successful mating programme is fundamental to sustaining dairy production from one year to the next. A cow must be mated in order to produce a calf in the following season and therefore to initiate lactation. Those calves born are also important, the heifers will be reared in order to replenish herd numbers and improve herd genetic potential. These are indeed the major reasons why mating time is important, however there is more to consider, especially in a seasonal supply New Zealand farming situation when we rely on pasture as our dominant feed source. Identifying the correct calving date for a particular property is a key to the financial success of dairy farms in NZ, as is a concentrated calving pattern and reduced empty rate.

This article will consider the components of a successful mating programme; provide some helpful tips as well as highlighting some current issues...

The Oestrus Cycle in brief:
Central to managing a successful breeding programme is a basic understanding of the oestrus cycle of a cow.

(For more information on this topic, see the book: Milk Production from Pasture – Principles and Practices).

- Once a heifer has reached puberty she should have an oestrus cycle until she conceives. This is a cycle in which the animal shows oestrus (or “heat”) every 21 days.

- The first behavioural oestrus occurs around 47 days after a “normal” calving. This interval is prolonged in younger cows, those which calve in poor condition, those underfed after calving or those that have had calving difficulties or retained placenta etc.

- The major feature of the cycle is oestrus. It is technically defined as that period when a cow or heifer will stand to be served by a bull. The cow will also stand to be mounted by herd-mates which may or may not be in oestrus. This characteristic is vital to efficient oestrus detection if cows in a herd are being artificially inseminated.

- The average duration of oestrus is 13-15 hours; however it may last as little as 2 hours or as long as 30 hours. During this time, the ovary contains a large follicle that is secreting oestrogen. It is this hormone that produces the behavioural responses. Oestrus is shorter and often less intense in younger animals and is often shortened if the animal is served several times by a bull.

- 8-12 hours after the end of oestrus, the follicle ruptures and releases the egg (ovulation) – in some cases ovulation may occur during oestrus or more than 24 hours after the end of oestrus.

- If the cow is inseminated fertilisation will occur within 6 hours of release. Delayed fertilisation results in lowered fertility, possible because of abnormal development. Irrespective of whether an egg is fertilised, it will start to descend the ovduct (fallopian tube). This duct connects the ovary to the uterus and the rate of descent is carefully programmed to last 4 days. During this period the ruptured follicle undergoes a transformation. It is converted to a corpus luteum (or yellow body) which secretes increasing amounts of the hormone progesterone. If fertilisation does not occur, the corpus luteum secretes progesterone until day 19 when a series of complex hormonal changes cause it to regress, progesterone secretion is markedly reduced and the cycle begins again. When CIDRs are used on farm they mimic the hormone released by
the corpus luteum, and when the CIDR is removed, it mimics regression on the corpus luteum – and therefore starts the cycle again.

**Nutritional Anoestrus**
Cycling can be delayed when cows are under situations of negative energy balance, where their energy demand of milk production exceeds their intake and tissue mobilisation. This is a common situation in pasture fed cows in early lactation and is influenced by age, breed, body condition score at calving, feeding level after calving and any other factor which may reduce appetite, feed intake or feed quality. Young Friesian cows are the most likely to experience a period of anoestrus and not cycle at the start of the breeding programme. The influence of condition score at calving and level of feeding after calving is illustrated in table one below. The key message is to aim for a condition score of at least 5 at calving, and provide an adequate feeding level post calving, in order to minimise the days to first oestrus.

**Table one: Effects of BCS at calving and feeding level after calving on the average interval from calving to first oestrus (days).**

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<tr>
<th>Cow condition score at calving</th>
<th>Feeding level kgDM/cow/d</th>
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<tr>
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<td>6</td>
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**Hormonal Treatment:**
The most successful approach for anoestrus cows involves use of a CIDR intra-vaginal device (to provide progesterone priming for 5 or more days) with an injection of hormone (oestradiol) 24 hours after removal. 2-5 days later treated cows should be observed for oestrus. Hormonal intervention treatments are useful but only in conjunction with a planned whole farm approach aimed towards improved feeding programmes, better productivity and improved profitability. The use of these treatments with non-cycling cows is useful for increasing the proportion of cows which conceive during the first 6 weeks of the seasonal breeding programme.

**Tips to stimulate non-cyclers to cycle:**
- Check the non cyclers for signs of infection. A new system called “metri-checking” has been developed by a Cambridge vet and has been used widely this season. This is a system that is simple and fast enough so that you can check the whole herd for signs of infection.
- Increase supply of feed or feed quality if possible OR
- Reduce energy demand – milk problem cows once daily instead of twice.
- Consider hormonal treatment if condition and feed allowances are good.

**Heat Detection:**
If you are using an artificial insemination programme, it is imperative that those people working with the cows are taught to notice the signs of oestrus – cows “bulling” or riding each other, signs of rubbing over the tail and hips etc. A great tool to help explain what to look for and why is Dexcel Farm Fact 1-9 Heat Detection (to view Farm Fact 1-9 click here). **Tail painting** is an excellent tool for detecting cows in oestrus. Cows should be tail painted a month before planned start of mating so that you can identify those cows that haven’t cycled prior to mating start. **Pressure sensitive devices** (e.g. Estrus Alerts (Ambreed), Kamars) are also very useful. These devices either have an adhesive surface or are glued in place and turn red with the pressure of another cow’s weight. Some farmers use pressure sensitive devices for young cows or the first cycle of artificial breeding and tail paint over them.
It is also important that once the cow has been identified, that she is *drafted out* of the herd without too much fuss so she can be inseminated. Depending on the set-up on different farms it can be difficult to actually draft out cows, so bear this in mind when you have inexperienced staff involved! Some people will keep a can of shaving cream in the dairy to identify cows to be drafted out. Discuss the things that have worked in your shed in the past with your staff/managers.

**Milk Protein:**

Australian work on the InCalf Project has highlighted a relationship between milk protein percentage and dairy cow fertility. They found that cows with a milk protein percentage of 2.75 or less had 6 week in calf rates of 52% compared with 67% for cows with milk protein percentage of greater than 3.50%. Similar trends were found for 3-week submission rate, first insemination conception rate and 21-week not in calf rate. It is important to consider that low milk protein percentage does not cause poor fertility. There is simply an association between the two, i.e. cows with low milk protein percentage are more likely to have poor fertility. It has been suggested that milk protein content is a reflection of energy balance and prolonged negative energy balance in early lactation is known to result in poor fertility. Cows in negative energy balance will show an increase in milk fat and a decrease in milk protein. For more information refer to [http://www.nhia.org.au](http://www.nhia.org.au) (Type "protein" into the search box)

**Don't forget heifers!**

Timing of heifer puberty is influenced by breed, age and weight. Friesian and jersey heifers should reach puberty before 12 months of age but it is vital that all heifers reach puberty at least 3 weeks before the planned start of their first mating season (i.e. at about 14-15 months of age). Generally, animals that have reached 60% of their adult body weight a month before the start of the mating season are likely to have reached puberty and exhibit regular oestrous cycles. It is a good idea to mate heifers at the start of mating to give them more time to cycle after calving. Fertility improves with the number of oestrus cycles animals have had since calving so these animals will have a better chance of getting back in calf in the subsequent season.

**Induction**

For many years, dairy farmers in New Zealand have been able to induce late calving cows to calve earlier, thus reducing the spread of calving and giving a later calver the opportunity to conceive earlier for the next season. The New Zealand Food Safety Authority has recently reassessed the use of the drugs involved in the induction process with specific emphasis on residues in meat and milk and animal welfare. As a result of their review, there is a revised meat withholding period of 35 days and milk withholding of 12 days. They are also considering action to remove claims on labels relating to non-therapeutic or routine induction of calving in dairy cattle. The proposal is to require the necessary label changes by February 2005. It is to be noted that there is much discussion on this topic currently and if use for non-therapeutic inductions is managed within an approved code of practice, the milk withholding will be reviewed. For more information please refer to the New Zealand Food Safety Authority [http://www.nzfsa.govt.nz/](http://www.nzfsa.govt.nz/).

The use of induction as a management tool to reduce calving spread may not be available in seasons to come – how will we cope?

- A paper called "Management for Sustainable Reproduction" with a section on "Induction Effects" was written by Julian Stevens from LIC. This paper looked into the effects that induction was having on farm. It was noted that the late calving cows did have shorter inter-calving intervals, and so calved earlier the following season. Therefore, the difference in the calving date in subsequent seasons between induced and late calving cows is not as great as was previously thought. Analysis of economics was based on data from commercial farms and showed that although there was a small profit in a well managed induction programme, the benefits may not be as great as many believe. With changes to management to improve reproductive performance, or changes to the farming system (e.g. earlier calving, increased stocking rate), the negative economic impact of removing induction from a farm system can be reduced even further.
- We simply need to become better at managing the whole system – a tight calving pattern is often a reflection of, rather than the cause of, a successfully run dairy farming system!
Some Targets:

In order to check if your herd is on track for a successful mating, aim for -
- 95% of the herd to be submitted for mating at least once within 4 weeks of the start of mating and 100% submitted at least once within 7 weeks of the start of mating.
- 90% of your herd should be in calf 7 weeks after the start of mating.

The Dexcel Repro chequer is a tool you can use to assess your herd’s reproduction and mating performance – have a look on [http://www.dexcel.co.nz](http://www.dexcel.co.nz)

Points to consider for your herds mating:

- Condition Score -should be at least 5 at calving
- Negative Energy Balance – minimise length and severity post calving
  - Minimise number of metabolic problems at calving time
  - Budget feed, plan the first round and manage pasture residuals to maintain high quality feed.
  - Monitor changes in milk protein % (want it to increase not decrease during mating)
- Heat Detection – Train staff, tail paint a month prior to mating start to identify non-cyclers early
  - Vet check problem cows (e.g. those that had difficult calving, twins, discharge)
- Consider use of pressure sensitive devices
- Heifers need to be well grown and at 60% of mature body weight at mating
- Mate heifers slightly early so they have time to recover after their first calving
- Vet check bulls to ensure they are in good “working order” and don’t carry disease – one bull is required to run with the herd for every 30 cows not in calf.
- Consider use of once daily milking or CIDRs for cows that are not cycling naturally

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