

Scrimgeour, John (2006)

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November 2006

This project was undertaken to fulfil the requirements of P I C/
Kellogg Rural Leadership Programme 2006

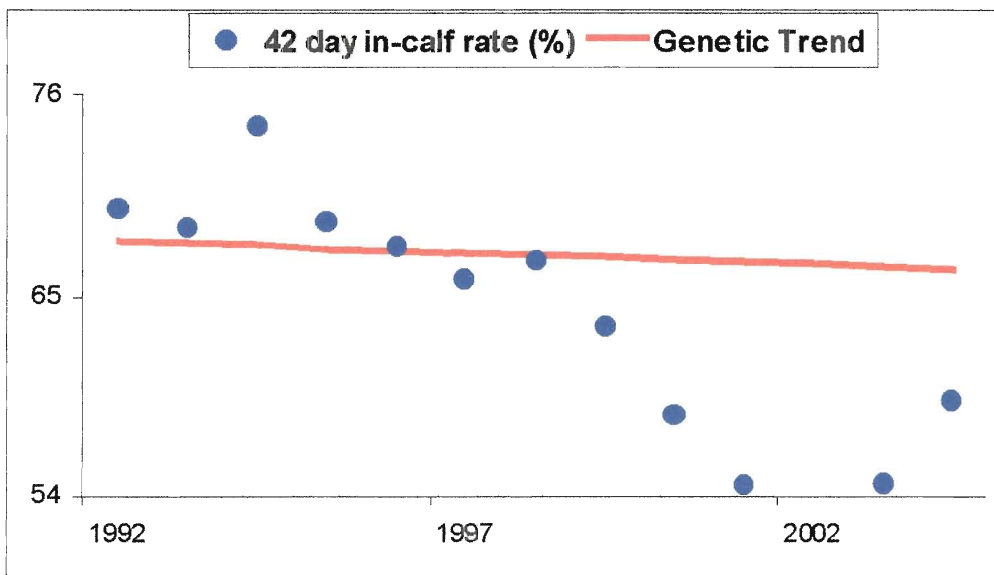
INFLUENCING THE IN-CALF RATE OF DAIRY COWS

Getting cows in calf has always been a concern for dairy farmers. The term "close to profit" describing a cow as being close to calving and earning an income sums up the need to get cows "in-calf". Maximising the number of cows in calf or pregnant also maximises farmers opportunity to cull cows for other less desirable traits. In recent years there has been much concern about the supposed increasing rate of empty cows, with reports of empty cows reaching 20 - 25% in some herds.

This issue is addressed in this report with consideration focusing on genetics, feeding and stock management. Reference is made to survey conducted enquiring upon farmers mating management practises (refer appendix one). There were 53 respondents to this survey.

Genetics

The below graph illustrates how over the last 15 years six week in-calf rates have varied by as much as 20%. It also illustrates that there is a genetic component to this decline, but that this equates to only about one tenth of this variation. The issue then becomes what can and do some farmers do to achieve high in-calf rates?



The only conclusion that can be drawn from this is that the genetic influence upon declining cow fertility, whilst significant, is not the main cause of declining results.

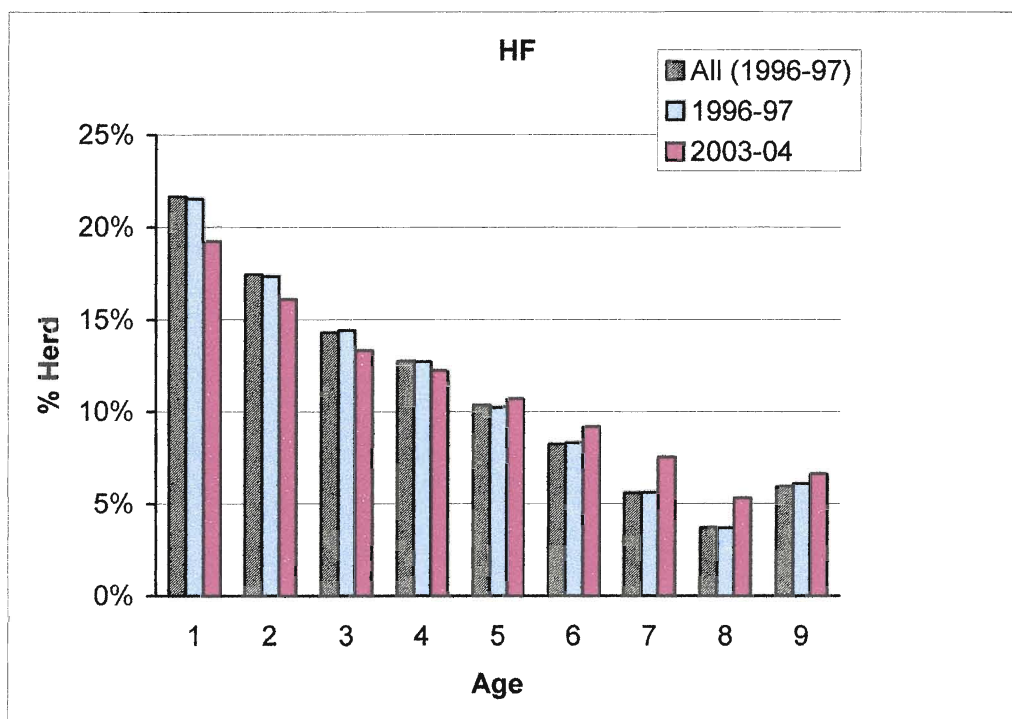
Of course, if a farmer were to pursue a course of choosing bulls with a high fertility breeding value (BV) it would positively influence herd fertility

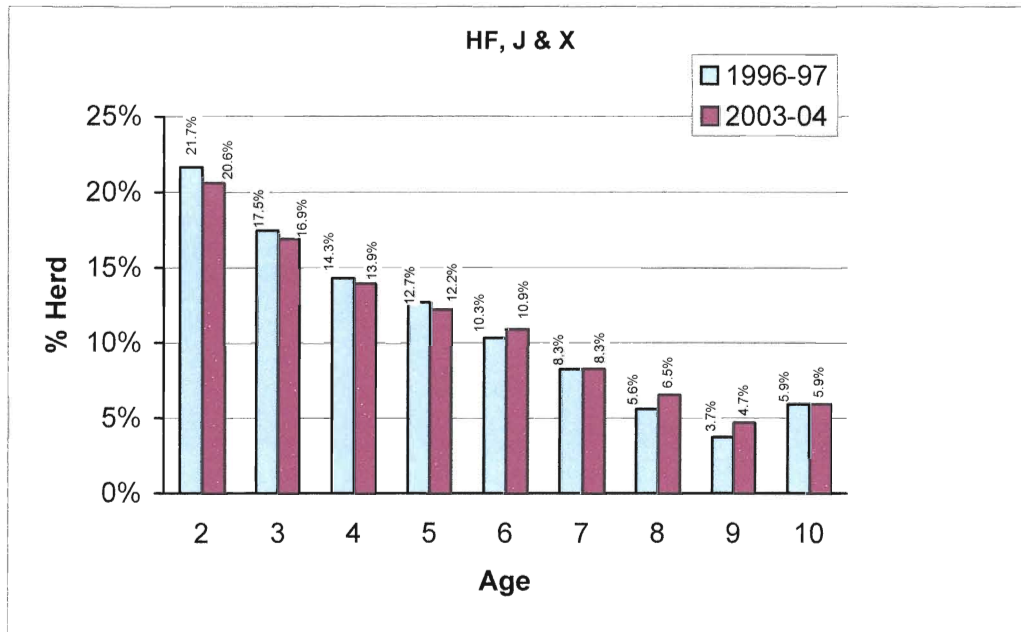
in the longer term. The practical implication of using bulls with a high fertility BV is that the bulls used would have a lower breeding worth. Selecting bulls with a BV of +4 (cf 2006 Premier Sires Team Friesian average +1 and Jersey average +1.5) would mean that at normal stocking rates of 3 – 4 cows/ha income would be reduced by \$60- \$80/ha.

Crossbreeding of cows is actually a much quicker way of influencing cow fertility using genetic influences. Hybrid vigour alone is estimated to add 3.5% to fertility BV for first cross animals. This can be achieved in one generation compared to the scenario outlined previously using bulls with a BV of four, which would take approximately 15 years to achieve that result.

Continuing with rotational crosses retains approximately 2% BV and crossbred sires retain approximately 1.5% hybrid vigour. This means considerably quicker gains in herd fertility can be made through crossbreeding than through using bulls with high fertility BVs.

There are other management factors that may have contributed to reducing the genetic ability of cows to get in calf. One factor is the huge growth in national herd size. Between 1990 and 2005 cow numbers rose from just over 2,000,000 to almost 4,000,000. The following graphs illustrate the ageing population of dairy cows during this period.





In practice this has meant that many cows, which would normally have been culled, have remained in herds and in time contribute to the increased number of empty cows.

Another potential contributor is that since the 1970s, farmers have been able to induce cows to calve earlier and this has enabled the retention of many cows that would otherwise be culled as empty. This has been a very helpful practice for many farmers allowing them to cull other less desirable cows as well as build cow numbers without having to purchase. However, the adverse impact of that has been the retention of less fertile cows.

Feeding

Some would say feeding is the most critical component of herd fertility. The reality is that cows need to be well fed to produce milk and feeding levels aimed at maximising milk production will also maximise reproductive performance. For example, trials have consistently shown that for each extra condition score at calving cows will produce an extra 15 kilograms of milk solids. It has been well proven that cows calving at condition score five produce at higher levels than those that calve in lighter condition. Cows calving at condition score four will take an additional 8 – 10 days to show first heat. This demonstrates how good feeding levels impact on both production and reproduction results.

Given that a good conditioned well-fed cow takes approximately 40 days from calving to first heat and the average cow has little more than 60 days from calving to mating, cows calving in lower condition will have

lower submission rates and, following on from that, slower and lower calving rates.

It is also well proven that cows that are gaining weight during the mating period will have a higher conception rate. In a New Zealand pastoral based production system this can sometimes be difficult to manage given the vagaries of climate. For instance, in the Bay of Plenty during spring of 2005 grass appeared in ample supply and cows well-fed. Yet it would appear from the pretty ordinary milk production levels and initially lower non return rates that cows were not as well fed as farmers thought. A lot of wet and cloudy weather is blamed for producing plentiful grass that was lacking in substance.

Conversely, a cold, windy and dry spring in 2006 has had cows under more obvious feed pressure. Some herds evidenced milk production drops of up to 15% during the first three weeks of mating and while it is early days yet, it is expected this will also have some impact on mating results.

To some degree these situations can be managed by introducing supplements. Further, once a day milking is gaining in popularity as a means to bring about a better balance between feed input and production output, particularly for cows under pressure.

Modern cows are so efficient at milk production and prone to lose weight during early lactation that it is more difficult to have them "turn the corner" and start gaining weight by the onset of mating.

It is interesting to note that discussions with, and survey results from, 53 farmers, that only 17, or approximately one third, achieved condition score 5 at calving. Given the importance of this in terms of both milk production and reproductive performance, why is this so?

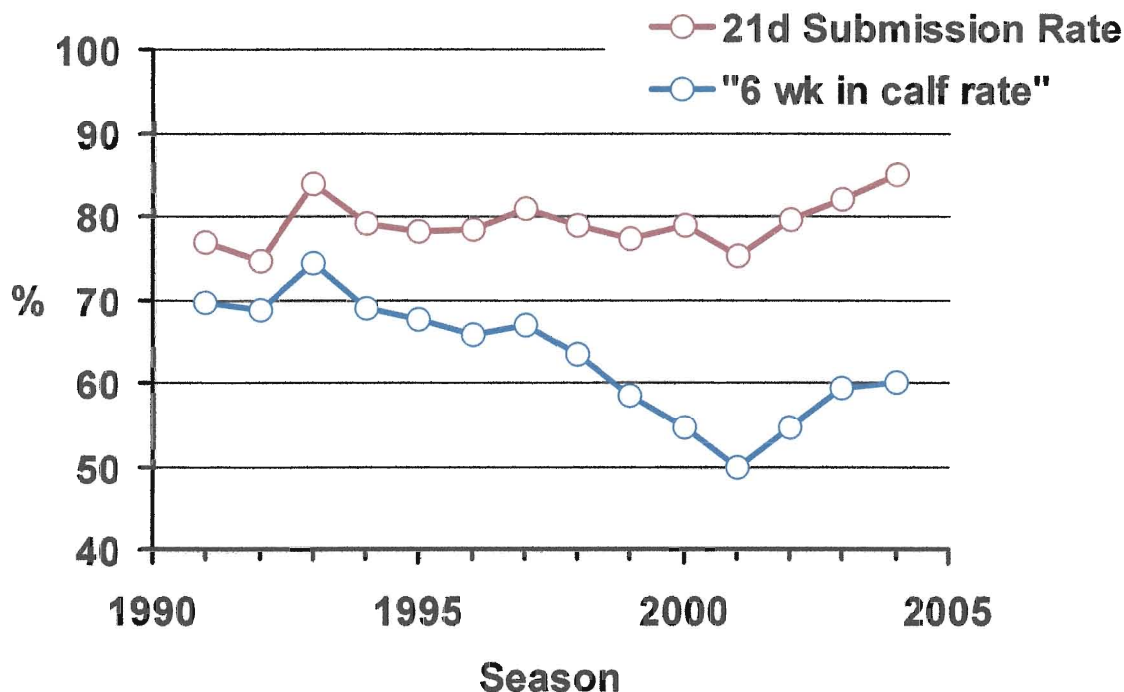
Firstly, those efficient dairy cows referred to earlier are more likely to be losing weight in the autumn than to be gaining weight. Every farmer interviewed had a strategy to address this issue - usually involving feeding supplements - often maize, silage, and a combination of drying off and once a day milking during the latter part of lactation. In spite of that, two thirds of these farmers did not reach their goal of cows calving at condition score five or better.

This is likely to be caused by adding insufficient extra feed or not starting feeding out soon enough and running out of time. Another likely cause is the temptation to focus on short term gain and continue milking when the feed consumed would be better employed getting cows into prime condition (condition score five) for next calving and mating.

The mineral status of cows can be an issue even in well-fed cows. Magnesium, selenium, copper and cobalt are the elements most at risk in New Zealand, but their need often varies according to location and soil type. Iodine is another very valuable element even if not in short supply. Many farmers use iodine principally to encourage cows to show stronger

signs of heat and it can help in identifying bulling cows. Most other minerals are in adequate supply providing cows are well fed. However, some farmers, as was highlighted in the survey, placed great store in providing cows with multiple vitamin and/or mineral supplements

Trend in National Cow Fertility



The above graph indicates that submission rates have actually increased during the last 15 years, yet the six-week in-calf rate has declined when the expectation would be for this to increase if submission rates were increasing.

An analysis of information gathered from the 53 herds shows that, for instance, 60% of those surveyed monitored cows prior to mating for heats. This was presumably to identify cows not showing heat. Yet only 16, or 30% of those surveyed, or 50% of those attempting to verify cycling cows prior to mating, used the most effective means available to "kick-start" cows.

Trial work done by Scott McDougall, of the Animal Health Centre, shows that anoestrous cows treated with CIDRs calved on average 15 days earlier than their untreated herd mates. The trial included 770 cows across nine herds. Not only does such a result prolong their likely herd life because of the earlier calving and likely earlier calving in subsequent lactations, but generates additional income per head (15 days at \$5 - \$6 per head per day), against a cost of approximately \$22 per head.

One farmer from the survey treated 84 anoestrous cows in spring 2005. These were all two and three year olds. The three year olds in particular

had calved in light condition as two year olds and again as three year olds. Thirty-seven percent held to first service. Twenty five percent were late calvers in 2006 and twelve percent were empty, as compared to a herd empty rate of six percent.

One farmer drafts off all cows that have not cycled at the commencement of mating and those cows are then run with a bull to encourage them to come into heat.

Selecting cows for mating

To my surprise, there seemed to be little relevance between how many times per day cows were observed on heat and having satisfactory submission rates. Fifteen percent of those surveyed observed cows at least six times per day while a further 15% (8 farmers) observed cows only once per day. Amongst farmers who observed cows frequently it did seem to translate into a more concentrated calving pattern, but that was not entirely consistent. Equally there were farmers who observed cows only once per day and still displayed a very concentrated calving pattern.

There was however much more uniformity about the use of tail paint and how it is applied. Without exception, all respondents said tail paint had to be put on carefully and thoroughly (even as carefully as nail polish in one case!), with emphasis placed on the removal of loose hair first. This is of critical importance as hair coming out can easily facilitate the loss of tail paint without being ridden by other cows. One said it should be applied only in a narrow strip so that it comes off more easily. Others placed emphasis on having paint on pin bones as well. Almost everybody worked on touching up tail paint on a weekly basis, although one farmer insisted that it be done daily.

Eight farmers, or about 15% of the group, used K-mars. In general this group spent less time on observation of cows than those who relied on tail paint.

Accuracy in heat detection is fundamental to achieving a satisfactory mating result. It can be seen from this information that one precise formula does not suit every farmer but it does show the need to concentrate and to constantly seek to improve techniques so as to maximise submission rates as well as have accurate heat detection.

During what is known as the *Strain Trial* at Dexcel's Scott farm, cows milk samples were monitored for fluctuations in progesterone to identify when cows actually ovulated. These results were then matched up alongside the actual herd mating data.

This revealed that 20% of heats that took place were actually missed by farm staff. Further, for 20% of inseminations, ovulation did not actually take place. Some of these cows appeared to show signs of heat but did

not actually ovulate; others were simply the result of inaccurate heat detection.

Results from one AB Technician Group give the following information:

Inseminations	3036
1 – 17 day returns	156
18 – 24 days returns	252
Non return rate	75%

Yet considerable variation occurred between herds:

	Herd A	Herd B
Inseminations	415/14%	388/13%
1 – 17 day returns	48/31%	12/8%
18 – 24 days returns	49/19%	28/11%
Non return rate	64%	80%

Whilst acknowledging other management factors have some bearing on these results they do highlight the importance of accurate heat detection. This is important principally to ensure cows have the opportunity to get in calf, but also shows the extent to which the cost of artificial breeding can escalate. One farmer, an AB technician encourages farmers when deliberating over cows with missing tailpaint to observe and feel if the surface is a polished floor or a gravel road before deciding to put cows up for mating.

Several farmers have a policy of always keeping a bull or bulls near the farm dairy to help with heat detection – cows on heat hurry to the shed and stop for discussions with the bull!

Two farmers have a policy of milking cows into a paddock alongside the farm dairy during the AB period. They are then able to inspect cows again after milking for on heat cows that may have been missed.

Livestock Improvement FarmWise Division is currently working on this issue of heat detection. They are attempting to develop a system of “automated heat detection” and are confident that this will be available within two years and should have the ability to remove the need to use bulls after AB. Some farmers already follow this practice although none of those who participated in this survey do so.

Bull Management

The management of bulls is another area with a great deal of variation in farmer practices and yet can have a significant influence particularly on final in-calf rate. Of the farmers surveyed, bulls used ranged from one per 100 cows to one per 30 cows.

There was also wide variability as to how these bulls were managed although the majority used some form of rotation policy. A few simply turned the bulls out with the herd at the conclusion of the AB programme. Others had very strict rules, such as:

- No bulls on concrete
- No Hereford or Friesian bulls (feet not good enough)
- Rotate daily
- Run dominant and submissive bulls in pairs
- Do not let bulls leave the paddock with the cows.

In spite of the above rules such as no Hereford bulls, many other farmers prefer and actively seek out Hereford bulls to highlight which calves are not AB bred and in other cases to produce valuable dairy beef calves. So once again, what suits one farmer is not necessarily appropriate for another.

The fact that most farmers rest or rotate their bulls does show an understanding of the need to keep bulls fresh and fit. Numbers required are largely determined by the number of cows that got in calf to AB. It is generally accepted that one bull can get about 30 cows in calf or serve three to four cows per day. This of course varies significantly between individual bulls and is also highlighted by some farmers' preference for different breeds of bull.

At the end of the day the real issue is that lame or tired bulls have a very poor success rate when it comes to getting cows in calf and whatever works for a farmer is what matters.

Summary

As set out at the beginning there are three key components involved in herd fertility.

There are animals that have higher or lower fertility than others and farmers should avoid animals with low fertility breeding values.

Feeding, while very important, is at least as critical in seeking productive animals.

Stock management and knowledge and understanding of animals is where farmers have the greatest opportunity to show improved mating results.

Mating, on a dairy farm comes at the end of a busy spring period yet farmers and their staff need to remain focused and make good use of systems and aids to get good results. High submission rates are important to achieving high in-calf rates. Accurate submission rates are critical to achieving a high conception rate.

To conclude, there is a bigger issue at stake than just empty cows. An analysis of one herd reveals the following statistics. Of 37 cows which

calved outside the first eight weeks of calving in 2005, seven, or almost 20%, were empty compared to a herd empty rate of 8%. Eighteen, or almost 50%, were late again in 2006. One cow died, three were sold, and eight, or just over 20%, calved in the first eight weeks of calving. This again highlights the advantages inherent in having a compact calving period.

Acknowledgements

Chris Burke - Dexcel

Scott McDougall - Animal Health Centre

Mark Dodd - Livestock Improvement Corporation

Steve Woolley - Te Puke Veterinary Centre

Rebecca White - typist

Appendix One – Survey Questions

Survey of farmers to ascertain mating management practices

- 1 Do you think that condition scoring is important?
- 2 Why? Or why not?
- 3 If so, what steps do you take to influence cow condition during 5 – 6 months prior to calving?
- 4 What is cow condition at calving?
- 5 What form of heat detection is used prior to mating?
- 6 What intervention takes place, if any?
- 7 How is heat detection carried out?
- 8 What aids are used?
- 9 How often are cows observed?
- 10 If tail paint is used, how carefully is it applied?
- 11 Is it kept touched up?
- 12 How long do you use AB for?
- 13 What number of bulls do you use?
- 14 How are they managed?
- 15 How long from planned start to mid-calving?
- 16 What percentage are in-calf in 8 weeks?
- 17 What is the final in-calf rate and how long was total mating period?
- 18 How much cow condition is lost post-calving?