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The relationship between breeding index and conception rate and the cost of delayed conception

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ABSTRACT

Herdowners comment that they are having increasing difficulty getting their higher producing, higher Breeding Index (B1) cows to conceive. The reports published on local and overseas data are inconclusive and do not substantiate their concern. A solution to this dilemma would be analyses of contemporary groups within herds with production records stored in the national data base. This would allow for the effects of different feeding practices. Any factor which increases the likelihood of a cow failing to conceive to a first insemination will reduce income by \$110/return. If the delay in conception must be rectified by induction, the cost is \$320 and increases to \$700 if the cow fails to conceive. These changes in income mean that if a herd of 170 cows has its pregnancy rate per breeding reduced from 60% to 59%, the estimated loss would total \$955. This emphasises the cost of delays in conception date.

INTRODUCTION

Overseas practices allow the level of feeding to be based on a cow's performance; the more a cow produces the more it is fed. This should mean that increasing milk production through selection and breeding will be accompanied by increased intake. The level of feeding for pasture fed cows is more dependant on weather and management than on milk production levels. Cows are farmed as one herd. They may each have a similar opportunity to achieve a similar dry matter intake, but there is no opportunity for preferential feeding. In spite of these major differences in management, Spalding (1975) showed that cows in the first quartile in milk production in American herds had a non-return rate which was 20.5% lower than herdmates in the fourth quartile. The effect of this negative relationship was much greater than that reported in two studies by Olds *et al.*, (1979). The first of these used records for over 17000 Holstein Friesian cows in 181 herds to identify a positive correlation between milk yield and services per conception. This meant that the highest producing 20% of cows in a herd had a 3% lower non-return rate. Their second study with records for over 71000 cows showed that those cows which were at least a standard deviation unit above the herd average had only a 2.5% lower non-return rate. These relationships were statistically significant and were most apparent in first lactations; but they were much less than differences between herds in non-return rate.

In spite of the importance of reproductive efficiency to maintaining the seasonally concentrated calving pattern in most New Zealand herds, very few studies have investigated the relative effects of milk production on this efficiency. Simpson (1972) used records from 40 herds in which cows in each herd were production ranked for milkfat about each herd's mean of 100. The conception rate to first service only varied from 63% to 66% for cows which had a ranking of less than 80 compared to those with rankings of 80 to 99, 100 to 119 or more than 119. An earlier study by Currie (1956) found that mature Jersey cows which conceived to first insemination

produced 14.7 kg milkfat during the month of conception and this was not significantly different from the 14.8 kg produced by inseminated herdmates which failed to conceive. Recent reports (Williamson, and Fernandez-Baca, 1992) have suggested that milk production and fertility may both be depressed in pasture-fed dairy cows which have high blood urea nitrogen levels because of an imbalanced ration associated with high protein and low energy contents of the pasture.

The cost of reduced fertility

Three trials with identical twins showed that each day's delay in the calving date of an individual cow after a herd's planned start of calving would reduce production by the equivalent of that herd's daily production during the flush period in October (Macmillan *et al.*, 1984). For these three trials, this level of production was the equivalent of 0.9 kg milkfat/cow/day. Since the average inter-service interval in well managed herds is 23 days (Macmillan and Clayton, 1980), any factor which contributes to a reduced chance of conception to a first insemination will delay this critical event by this interval of 23 days and reduce the subsequent season's production by the equivalent of 20.7 kg milkfat. At current prices this would represent a loss of \$120 in income from sales of milksolids.

This loss involving one cycle or insemination interval for an individual cow, can be translated to a herd effect by recognising that reducing a herd's pregnancy rate by 1% from 60% to 59% will increase the average number of services per conception from 1.667 to 1.695. This apparently small increase of 0.028 inter-service intervals per cow will be associated with a loss in income from milk sales of \$3.36 per cow (ie. $0.028 \times \$120$); or, \$571.20 in the averaged-sized herd of 170 animals.

Additional costs will also arise from a lower pregnancy rate also increasing the proportion of cows which have to be induced to calve prematurely or be culled as late calvers or empty cows. Although the induction process may reduce the

variation in lactation length among the cows within a herd, the induced animal will still produce about 7% less milksolids than a herdmate which had a normal calving on the same date. When this loss is combined with the cost of the treatments and subsequent veterinary attention, the total cost of an induction without sacrificing the premature calf is estimated at \$100. This is less than the \$700 difference between selling an empty cow for slaughter and having to buy or rear an extra herd replacement. If every cow which conceives during the tenth to twelfth week of a 12 week breeding programme is induced to calve, then any factor which reduced a herd's pregnancy rate per mating from 60% to 59% would increase the subsequent induction rate by 0.23% and the culling rate for failure to conceive by 0.29%. These represent increased cost or income losses of \$0.23 per cow for extra inductions and \$2.03 per cow for extra replacement animals. For a herd of 170 cows, this will total \$384.20.

Combined with the shorter lactations through later calvings with the remaining cows in the herd, a decline in fertility which reduced the herd's pregnancy rate from 60% to 59% would conservatively affect the following season's income derived from a herd of 170 cows by \$955.40.

This total will change with the relative value of milksolids, cull cows and bull calves or bobby calves. However, it is a conservative estimate relating to increased costs and decreased milk income. It does not include the effects of reduced culling on performance or a reduced rate of genetic

progress. The results of these calculations do emphasise the need to ensure that fertility is not compromised by aspects of management or breeding which either delay insemination because of anoestrus or poor oestrous detection, or reduce the chances of conception among the inseminated animals.

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