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*Brief communication*

THE CASE FOR INDUCED EARLY PARTURITION  
IN NEW ZEALAND DAIRY CATTLE

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The breakeven analysis was used to assess the economics of induction of calving. This required calculation of extra costs, costs saved and income lost. The induction technique under discussion consisted of the injection of a slowly absorbed corticosteroid formulation 3 to 5 weeks before the expected calving date followed, if necessary, by a quickly absorbed corticosteroid or a prostaglandin analogue 7 to 12 days later, a regime commonly employed in New Zealand dairy herds and reported upon by MacDiarmid (1979; 1980) Day (1979) Welch *et al.*, (1979).

EXTRA COSTS

These comprised the costs of treatment, of managing an increased number of retained foetal membranes and of replacing cows, culled or lost due to the technique.

The treatment costs comprised a drug and examination charge of \$4.50 per injection, a visit charge of \$15 and an average travelling cost of \$7. The number of cows treated at each visit was assumed to average 10. The cost per injection was thus  $\frac{(4.50 \times 10) + 15 + 7}{10} = \$6.70$ . Welch *et al.*, (1979) and MacDiarmid (1979) reported that 56.4% and 58.2% of the cows needed two injections. MacDiarmid (1979) also reported that 7.7% of treated cows failed to calve within 7 days of the second injection. It was assumed that 157 injections were required to cause 92 cows (100-7.7) to calve prematurely, i.e. 1.7 injections/cow. The treatment cost was thus:  $1.7 \times 6.70 = \$11.39$ .

The cost of managing retained foetal membranes comprised charges for visits and drugs, estimated at \$35 per case. Recent publications suggest that 25.2% (Welch *et al.*, 1979), 48% (Day, 1979), 20% (MacDiarmid, 1979) and 18.6% (MacDiarmid, 1980) of cows induced to calve prematurely retain their foetal membranes. The prevalence after non-induced calving is 1.8% in New Zealand (Moller *et al.*, 1967). For the purposes of this analysis it was assumed that induction caused 25% of the induced cows to retain their foetal membranes. MacDiarmid (1979; 1980) reported that 21.6% and 30.9% of these cases required veterinary attention.

A figure of 20% was used here and the cost of managing treatment-induced retained foetal membranes was thus:  $\frac{35 \times 20 \times 25}{100 \times 100} = \$1.75/\text{cow}$  induced.

Replacement costs for Friesian-type dairy cattle were \$52 (M.A.F., 1980).

Twenty seven farmers were asked to complete and return a questionnaire dealing with the fate of the induced cows (MacDiarmid, 1980). Seventeen replied and a sample of 299 cows was available for analysis. The wastage in these herds has been summarised and compared with N.Z. Dairy Board information (N.Z.D.B., 1980). For the purposes of this paper it was assumed that 10.5% of induced cows were culled due to the technique. Replacement cost was thus  $\frac{52 \times 10.5}{100} = \$5.46/\text{cow}$  induced.

These three costs give a total of \$18.60 per cow induced.

TABLE 1: WASTAGE AFTER INDUCTION AND IN TESTED HERDS

	<i>Wastage Following Induction</i>	<i>Wastage in Tested Herds (N.Z.D.B. data)</i>
Low Production	3.34%	5.05%
Old Age — Unsuitable temper	1.33%	1.15%
Reasons not Given	1.00%	2.87%
Sold for Dairying because of unsuitable type, injury	0.00%	2.09%
Sub-Total	5.67%	11.16%
Diseases:		
Miscellaneous	2.34%	1.43%
Mastitis	3.01%	0.95%
Reproductive Failure	15.05%	3.53%
Deaths	1.78%	0.30%
Sub-Total	22.18%	6.20%
Total	27.85%	17.36%

#### COSTS SAVED

It was then assumed that about one-fifth of the induced cows would have been culled, were it not for the possibility of induction. The cost of replacing an adult Friesian dairy cow with an in-calf heifer was \$52.00 (M.A.F., 1980). Added to this cost was the expected reduced production from the 2-year old replacement estimated at 26 kg milkfat (annual milkfat production from an adult induced cow is 158 kg, from a heifer 132 kg (I. Hook, 1980, personal communication). At the basic payout to farmers of \$2.18/kg milkfat, this was worth \$56.70. The cost saved by induction was thus  $\frac{52.00 + 56.70}{5} = \$21.74$

## INCOME LOST

This comprised losses due to reduced income from milk sales and from the sale of bobby calves.

The income from milk sales was reduced because induced cows produce less than those not induced. Welch *et al.* (1979) reported a production loss of 4% and O'Farrel and Langley (1975) one of 10-20%. This analysis was based on a 4% drop in production. The average yearly production has of recent years been 165 kg butterfat (I. Hook, personal communication) and the income lost was

$$\frac{165 \times 4}{100} \times 2.18 = \$14.39$$

Day (1979) reported that 2.2% of induced cows die after induction due to acute metritis and MacDiarmid (1979; 1980) that 1.9% and 0.9% die. A figure of 2% was used here. Although few in number these losses have severe economic effects since replacements are not readily available towards the end of the calving period. The potential production from an induced cow is 158 kg (96% of 165 kg) milkfat and the loss of income per induction

$$\frac{158 \times 2}{100} \times 2.18 = \$6.89$$

The income from the sale of bobby calves can be reduced due to increased losses at birth and immediately after, due to some calves being underweight. Recent publications quantify N.Z. calf losses (Table 2).

TABLE 2: CALF LOSSES

Source	No. born	% born dead	% dying within 4 days	% Total
MacDiarmid (1979)	571	15.2	11.4	26.6
Welch <i>et al.</i> (1979)	329	17.0	18.8	35.9
MacDiarmid (1980)	521	10.6	16.7	27.3

Before induction of calving became common practice, the calf losses were reported to be 5.7% (N.Z.D.B., 1975). For the purpose of this analysis it has been assumed that the induction of calving caused 20% of the calves to be unavailable for sale as bobby calves.

The income from bobby calf sales is variable from year to year, with the price in 1980 being about \$22 (M.A.F., 1980). Induction thus reduced the income/cow by  $22/5 = \$4.40$ . The total income lost per induction is thus  $14.39 + 6.89 + 4.40 = \$25.68$ . The completed analysis, with extra returns as the unknown, is shown in Table 3.

TABLE 3: BREAK-EVEN ANALYSIS OF INDUCED CALVING

	<i>Losses</i>	<i>Gains</i>
Extra Returns		$\kappa$ *
Extra Costs	\$18.60	
Costs Saved		\$21.74
Income Lost	\$25.68	
	\$44.48	\$21.74

\*Balance is achieved when  $\kappa = \$22.54$ .

#### EXTRA RETURNS

Extra returns are derived from the longer lactation achieved through the technique of induced calving. It is likely that induced cows produce at a level of 0.45 to 0.50 kg/d early after induction. Using a higher level the production increase due to 21 days extra lactation was 10.5 kg milkfat which at \$2.18/kg = \$22.89.

TABLE 4: THE FATE OF COWS INDUCED TO CALVE PREMATURELY

	<i>Number</i>	<i>Percent</i>	<i>Number Re-Induced</i>
Calving > 10 days earlier in the subsequent year	148	49.5	0
Calving $\pm$ 10 days of the anniversary in the subsequent year	50	16.7	21
Calving > 10 days later in the subsequent year	24	8.0	15
Culled for reproduction failure	44	14.7	0
"Wasted" for other reasons	33	11.0	0

#### CONCLUSION

It is our contention that there is no economic benefit from induction of calving unless there are long term advantages beyond the first year. The best available information concerning subsequent performance is derived from the follow-up questionnaire after MacDiarmid's trial (MacDiarmid, 1980). A summary of an analysis of this information is shown in Table 4. Eighty-nine cows (21 re-induced to maintain their calving date, 24 calving later and 44 failing to calve — i.e. 33.5%) thus fared badly, while 177 (66.5%) provided a profit for their owners. These conclusions lead to the following recommendations:

- (1) That induction of early parturition as presently practised in New Zealand be used as an emergency measure on late-calving cows only.
- (2) That only relatively young cows with several years of lactation ahead of them be induced.
- (3) That only healthy cows in good condition be induced.

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