INDUCED CALVING WITH CORTICOSTEROIDS: A COMPARISON BETWEEN INDUCED COWS AND THEIR CALVES AND CONTROL ANIMALS

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SUMMARY

Calving was induced with two injections of corticosteroids in 228 cows and 36 heifers and data from the cows and calves are compared with those from 71 untreated cows calving on the same farm at about the same time. Calf mortality was 15% after induction and 6% for controls. The mortality in the induced group was mainly in calves 15 kg and under. The calving to conception interval was longer after induced calving although the proportion of cows not pregnant was the same. Foetal membranes were retained in 21% of induced cows and 1% controls. There was no difference between induced and control cows in milk production or in the incidence of milk fever, mastitis or cow deaths.

INTRODUCTION

For some years induced calving has been used on New Zealand dairy farms, yet the production of cows that have been induced to calve has not been compared with those that calve normally. There are several reasons for this. The induced-calving cows are usually late so there are few comparable untreated cows calving at the same time. Expected calving dates are frequently unknown, hence degree of prematurity cannot be judged. Also, treatment regimes have been changing, and it is only now that a preferred procedure can be recommended and results compared with those obtained from untreated animals.

This paper is an interim report of a comparison between induced- and normal-calving cows.

MATERIALS AND METHODS

In 1976 a large commercial dairy farm changed from July-August calving to June-July and used induced calving to achieve this. This provided an opportunity to compare the production of induced cows with untreated herd-mates.

The cows were divided into groups and drug-treatment times as outlined in Table 1. All the induced cows were treated with an initial intramuscular injection of 20 mg dexamethasone trimethyl acetate (Opticortenol, Ciba-Geigy) and this was followed 6, 9

TABLE 1: NUMBER, TREATMENT AND CALVING DATES OF COWS IN THE INDUCED CALVING TRIAL

	Control	*Induced*	
		Early	*Late*
No. of cows	71	109	119
Treatment	—	A	B
Due calving dates	Jul. 19-25	Jul. 26-Aug. 7	Aug. 8-Sep. 1
Mean calving dates	Jul. 24	Jun. 29	Jul. 14

Treatments:

A. 20 mg Opticortenol Jun. 16 followed 6, 9 or 12 days later by 20 mg Betsolan.

B. 20 mg Opticortenol Jul. 1 followed 6, 9 or 12 days later by 20 mg Betsolan.

or 12 days later with an intramuscular injection of betamethasone (Betsolan, Glaxo) if the cow had not already calved. The heifers were not part of the experiment as there were no heifers allocated to the control group. Some cows were excluded owing to lack of adequate records, lost eartags, wrong injections, etc.

Calves were weighed within six hours of birth and recorded as live or dead when first seen. Calves were removed from the cows soon after calving and started on twice-daily artificial feeding. Foetal membranes were recorded as retained if they had not been shed by 24 hours post-calving. Manual removal of the retained membranes and treatment with antibiotics was carried out where necessary 5 to 7 days after calving.

Most of the calves were sold for slaughter. Sixty were kept on the farm till weaning at either September 7 or October 13 when they were also weighed.

Bulls wearing chin-ball harnesses were run with the herd from August 1. Six bulls were run at any one time and these were changed every three days from a pool of twenty. Conception date was determined by rectal palpation on November 26. Conception after October 20 could not be detected and cows conceiving after that time would be classified not pregnant.

Estimates of butterfat production were from consecutive evening and morning samples taken every second month, by the Auckland Herd Improvement Association. Somatic cells in milk were estimated by a rolling ball viscometer and tests were performed monthly by the Te Aroha Thames Valley Co-operative Dairy Company. Clinical mastitis and milk fevers were farmer diagnoses.

RESULTS

Calving Date

The mean calving dates for the different herds are given in Table 1. Prematurities for the controls were 0 ± 9.8 days (mean ± S.D.), early induced 33.6 ± 5.2 days, and late induced 37.0 ± 7.5 days.

Calf Deaths

Calf mortality was higher in the induced groups than in the controls ($P < 0.02$). If the calves are considered in two weight classes, above 15 kg and below, then the mortality of the heavier calves is very similar in the induced and control groups (Table 2). The low birthweight calves showed very high mortality.

TABLE 2: CALF MORTALITY, IN BIRTHWEIGHT CLASSES

	Control	*Induced*	
		Early	*Late*
No. alive:			
> 15 kg	67	72	78
⩽ 15 kg	0	15	28
No. dead:			
> 15 kg	4	4	4
⩽ 15 kg	0	17	9
% Mortality:			
> 15 kg	6	5	5
⩽ 15 kg	—	53	24

Calf Weights

The birth weights of the calves in the control and induced groups were control 26.7 ± 5.3 kg (mean ± S.D., range 17-46 kg); induced, early 16.8 ± 4.6 kg (range 4-25 kg); induced, late 19.3 ± 6.8 kg (range 7-34 kg), and heifers 23.7 ± 5.3 kg (range 11-32 kg).

Fertility

The mean calving to conception interval for cows that became pregnant and the percentage of cows not pregnant are shown in Table 3. Early-induced cows took 11.9 days longer than late-induced cows to become pregnant ($P < 0.01$) which in turn took 4.9 days longer than controls (NS). Cows with dead calves took

TABLE 3: CALVING TO CONCEPTION INTERVAL FOR COWS THAT BECAME PREGNANT AND PERCENTAGE OF COWS NON-PREGNANT

	Control	*Induced*	
		Early	*Late*
Calving to conception (days)	49	66**	54
Non-pregnant (%)	25	17	29

**Induced (early) > Induced (late) ($P < 0.01$) > Controls ($P > 0.05$)

11.9 days longer than cows with live calves ($P < 0.01$). The calving to conception interval increased with increasing prematurity ($b = 0.54 \pm 0.21$ days/day, $P < 0.01$). The percentage of non-pregnant cows is not significantly different between groups, including the heifers ($\chi^2 = 9.16$, d.f. $= 3$, $P < 0.05$).

Butterfat Production

Milk production data were available from three tests. Using data from 40 control cows and selecting 40 induced cows solely on the basis of a similar calving date to the control cows (Table 4), butterfat production was very similar in the induced and control cows. Using the production index figures of the Auckland Herd Improvement Association (which correct for cow age, breed and stage of lactation, basic index for this herd = 100), there is no difference between the groups.

When the butterfat production and production index data for induced cows with calves 10 kg or less at birth are compared with controls selected solely for similar calving date (Table 5), then again there is little difference between groups. The fertility data for these cows are included in the same table. Most of the induced cows conceived before they were due to calve naturally.

TABLE 4: MEAN PRODUCTION INDEX AND BUTTERFAT PER COW FOR INDUCED PARTURITION AND CONTROL COWS

	Induced	*Control*
No. of cows	40	40
Fat (kg)	86	87
Days	151	145
Fat/day	0.57	0.60
Production index	102	102
Prematurity (days)	—37	—1

TABLE 5: MILK PRODUCTION, PRODUCTION INDEX AND FERTILITY OF COWS WITH INDUCED PARTURITION AND CALVES WEIGHING 10 kg OR LESS, COMPARED WITH COWS WITH NORMAL PARTURITION

	Induced	*Control*
No. of cows	24	24
Fat (kg)	80	81
Days	155	150
Fat/day	0.52	0.54
Production index	95	97
Mean calf weight (kg)	7.6	25
Mean calving to conception (days)	61	52

Cow Health

Five cases of clinical mastitis were recorded in the treated cows and one in the control cows in the month following calving ($P > 0.5$). Monthly cell counts in the bulk milk for July, August and September were 250 000, 300 000 and 250 000/ml. These counts cover the first three months after calving commenced and give no indication that clinical or subclinical mastitis is increased.

Forty-eight (21%) of the induced cows had retained foetal membranes compared with one of the controls ($P < 0.001$). Seventeen of the induced cows were examined by the veterinarian for retained foetal membranes and twelve (5%) were treated with antibiotics. No controls were treated.

Only two clinical cases of milk fever were recorded; both were control cows.

No cow deaths were recorded in the month following calving.

DISCUSSION

The calf mortality was clearly related to calf weight. Calves up to 10 kg lighter than the mean birthweight of the control calves (up to about one month premature) showed similar mortality to the controls. Calves with very low birth weights had very high mortality.

The fertility of the cows with induced calving was reduced compared with the controls as the calving to conception interval was longer for induced cows. Nevertheless, the mean conception date for the induced animals was earlier than if they had not been treated. The relationship between calving to conception interval and prematurity was not seen in an earlier study (Welch *et al.*, 1977).

The health of the induced cows was generally similar to the controls, although the incidence of retained foetal membranes was significantly higher than the controls. This is consistent with other studies (Welch *et al.*, 1977).

The incidence of clinical and subclinical mastitis in the induced cows was low. Buddle *et al.* (1976) suggested that corticosteroid injections could increase the incidence of mastitis. Satisfactory milking shed hygiene could have prevented this effect.

The milk production of induced cows appears similar to untreated cows even when extreme prematurities were considered. While this observation must await confirmation from the results of the full season's production, it seems at this stage that the longer production season of the induced cows should lead to higher total production.

CONCLUSION

The double injection procedure for inducing calving increases calf mortality compared with controls if the calves are more than about one month premature. There is no evidence from this trial that there is any adverse effect from the treatment on milk production, mastitis, milk fever or cow deaths. The interval from calving to conception may be increased and the incidence of retained foetal membranes is increased in treated cows.

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