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# INTERRUPTED PREGNANCY IN THE DAIRY COW

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## SUMMARY

The incidence of long return intervals, abortions and premature calvings was surveyed in 36,218 dairy cows in 208 herds in the Huntly district.

Long return intervals, possibly associated with early embryonic deaths, occurred in 2.3% of the cattle present in 76% of the herds. The national economic importance of the problem could be approximately £1.5 million annually.

Abortions occurred in 1.2% of the cattle present in 50% of the herds. Abortions were mainly owing to brucellosis (45%) or of unknown origin (42%) and were not associated with subsequent infertility. The economic importance of abortions in the national dairy herd was calculated to be £0.75 million, annually.

It is suggested that length of pregnancy alone should be considered in determining the occurrence of abortions (< 247 days), premature calvings (247-276 days) and full term calvings (> 276 days).

A SURVEY of infertility in dairy cattle was conducted by veterinary surgeons of the Huntly District Veterinary Club in collaboration with the Diagnostic Station, Ruakura Agricultural Research Centre during the period from March 1, 1964 to April 30, 1966. This paper reports on the prevalence of long return intervals, abortions and premature calvings, and the causes of abortion in the dairy cattle.

For the purposes of the survey *long return intervals* were considered to occur when cows returned to oestrus 2 to 5 months after presumed conception without evidence of abortion; *abortions* were defined as terminations of pregnancy from 120 to 250 days after conception; and *premature calvings* were defined as terminations of pregnancy 251 to 281 days after conception.

## MATERIALS AND METHODS

From the herds of 672 dairy farmers in the membership list of the Huntly District Veterinary Club, 250 were randomly selected for survey. During the 1964-5 season, studies were made in 208 herds but in the 1965-6 season the number was reduced to 192 herds owing to farmers

leaving the district or no longer participating in the project. The numbers of pregnant cattle surveyed were 17,090 and 19,128 in the first and second seasons, respectively.

In the course of the survey, farmers were asked to report cows in which long return intervals occurred. Blood samples and, when obtainable, samples of vaginal mucus, were collected for laboratory examination. In the second year, close attention was given to ensuring that accurate data on the occurrence of long return intervals were obtained.

Farmers were also asked to report all abortions in their cows. A veterinary surgeon then visited the farm to obtain relevant details and specimens suitable for diagnosis of the cause. At the end of the season following the abortions, the mating records of all cows in herds where abortions occurred were examined. Comparisons were made of the conception rates to first mating and the numbers of non-pregnant cows at the end of the mating season, between cows which aborted and those calving normally.

Data on variation in the gestation length in cattle which did not abort were obtained from records of some 985 cows in the survey.

## RESULTS

Table 1 presents data on the incidence of long return intervals and abortions in cattle during one and both seasons of the survey, respectively.

In some of the cows with interrupted pregnancy, studies of specimens submitted to laboratory examination gave data on the causes of infertility and these are listed in Table 2. With animals showing long return intervals, brucellosis was diagnosed on blood titres of 1:320 or higher, leptospirosis on titres of 1:5,000 or higher, vibriosis

TABLE 1: PERCENTAGE INCIDENCE AND CULLING RATE OF CATTLE WITH LONG RETURN INTERVALS OR ABORTIONS

	Long Return Intervals	Abortions
1964-5 season ....	—	1.3 (217/17,090)
1965-6 season ....	2.3 (405/17,262)	1.1 (216/19,128)
Cows culled ....	40 (162/405)	39 (169/433)

Figures in parentheses refer to cows detected with infertility, or culled, of total number examined.

TABLE 2: PERCENTAGE INCIDENCE OF DISEASE ASSOCIATED WITH LONG RETURN INTERVALS AND ABORTIONS

No. Cows Examined	Brucellosis	Leptospirosis	Vibriosis	Other Infections	Unknown	
Long return intervals	.... 172	5	6	3	<1	86
Abortions	.... 266*	45	12	—	3	42

\*4 cows infected with both *Brucella* and *Leptospira* organisms.

TABLE 3: PERCENTAGE CONCEPTION RATES TO FIRST MATING IN COWS FOLLOWING ABORTION AND IN COWS AFTER NORMAL CALVING FROM THE SAME HERDS

Time of Mating after Parturition

Cows	≤ 60 days	> 60 days	All Times
Aborted	24 (3/13)	62 (120/195)*	60 (123/208)
Normal calving	50 (1,831/3,638)	64 (8,041/12,527) <sup>b</sup>	64 (12,387/19,173)*

Figures in parentheses refer to cows pregnant of those mated.

\*Includes cows where time of mating *post partum* not accurately known. Difference: a, v, b; not significant.

or other infections on the demonstration of the specific organisms in samples of vaginal mucus. In the cows which aborted, sufficient specimens to allow accurate diagnosis were available from 266 animals and brucellosis was diagnosed on rising blood titres or demonstration of the organism in the specimen examined, leptospirosis on titres of 1:5,000 or more and other infections on the finding of specific organisms in specimens. There were 4 cases of abortion where blood serum titres indicated simultaneous infection by *Brucella* and *Leptospira* organisms.

Data on fertility following interrupted pregnancy were obtained from some of the cows affected. Thus, in 21 animals with long return intervals and which were mated immediately oestrus was detected, the conception rate to first mating was 86%. With 31 other cows not remated until the spring months, the conception rate to the first mating appeared normal (61%). Similar data on fertility in cows following abortion are presented in Table 3.

Considerable variation existed in the lengths of gestation for 985 cows which calved normally (Fig. 1). This

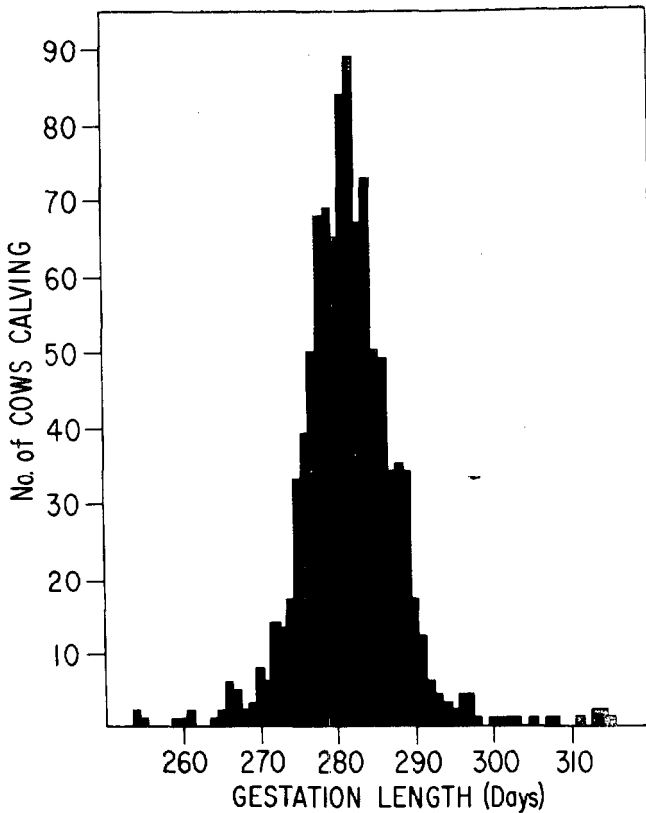


Fig. 1: Gestation lengths in 985 normally calving cows.

finding is in agreement with results from an earlier survey (Anon., 1953). To investigate reasons for the termination of pregnancy in cattle, the gestation lengths of the 985 cows were classified at intervals of 10 days (251–310 days) and the numbers of animals calving in the same 10-day periods calculated for all cows under survey. These results are presented in Fig. 2, together with data for cows with gestations of less than 250 days and which showed evidence of retained placental membranes (see Moller, *et al.*, 1967).

#### DISCUSSION

Surveys conducted by the New Zealand Dairy Board have provided information regarding the prevalence of

abortions in dairy cattle. Thus, in the period 1940-4, some 5% of 39,000 cattle aborted each year (Anon., 1945). The information was collected by herd testing officers during their monthly visits to farms and it is doubtful whether all cases of infertility were noted and whether differentiation was made between abortions (120-250 days gestation) and premature calvings (251-281 days gestation). In a later survey, of 256,000 cows under test in the North Island, 2.8% aborted (Anon., 1956). As the information was collected from farms at one time in September after which further abortions may have occurred (calving is generally during July to October), the accuracy of the figure can be questioned. During the present survey, farmers often reported cases of "abortion" which should have been termed premature calving and one may reasonably assume that similar cases were included in the results of the Dairy Board Surveys. Including such "incorrectly" reported cases to gain comparable figures, the number of "abortions" in the present sample was 574 or 1.6% of all cattle. It cannot be stated whether this low incidence compared with that in earlier surveys is due to a decrease in abortions caused by brucellosis, through

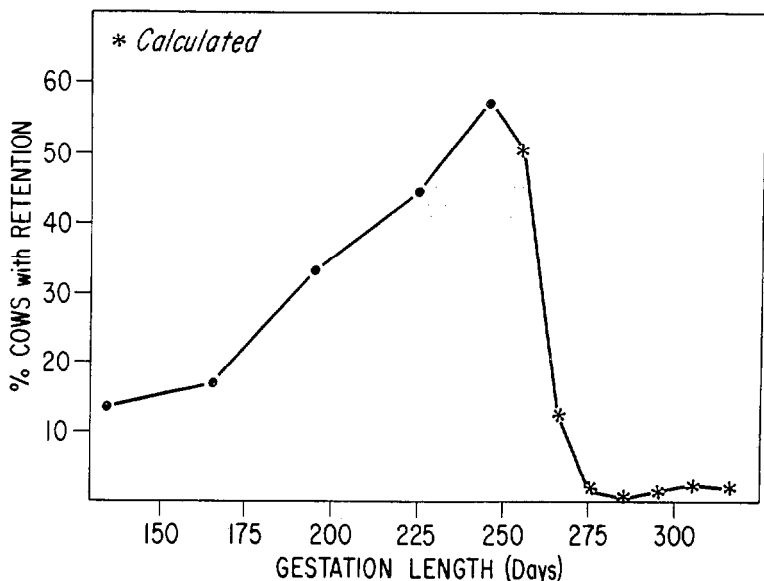


Fig. 2: Gestation lengths in cows with retained placental membranes.

the many years of calfhood vaccination (*Brucella abortus* Str. 19), or whether it is merely owing to differences in methods of data collection.

Brucellosis is known to cause the highest number of abortions among heifers in unvaccinated herds. This fact may explain the results of the Dairy Board Surveys reported in 1945 and 1956 that abortions occurred in 10% and 3.6% of heifers, and 3.5% and 2.6% of older cows, respectively. In the Huntly District Survey in 1966, abortions were 0.8% in heifers and 1.2% in adult cattle. Thus it seems that, in a district where an intensive vaccination programme has been conducted, there has been a marked reduction in the incidence of abortions. However, despite many years of calfhood vaccination with *Br. abortus* Strain 19 vaccine in the herds under survey, 45% of all abortions were in fact caused by brucellosis. It is of interest, too, that in the survey only one farmer did not practise vaccination for brucellosis and no abortions occurred in his herd. Thus it remains questionable whether further reductions in incidence of brucellosis may be achieved through continued vaccination.

The economic importance of abortions to the dairy industry in New Zealand may be calculated from the present study. Of the 433 cows which aborted, 169 were culled almost immediately (Table 1), and the remainder milked in the herds and mated successfully (Table 3) with the rest of the herd some months later. Using estimates of production for New Zealand dairy cattle (Anon., 1951), the 169 cattle culled, 27 of which were heifers, could have been expected to produce some 46,660 lb butterfat. The 264 animals—42 heifers and 222 adult cows—which aborted and were milked in the herds would have reduced production; an estimate of the annual reduction in butterfat from aborted cattle is 26 lb per heifer and 63 lb per mature cow (Anon., 1951). This would represent a further loss in production of 15,078 lb butterfat, and therefore results in a production loss of 61,738 lb butterfat.

The loss due to wastage was assessed after accepting the principle that wastage rate determines replacement rate. The assessment is based on the extra production which might accrue as a result of reducing the numbers of replacements and thus being able to carry more milking cows. Data for New Zealand herds suggest that 20%

of heifers and 24% of calves are required for replacements and that 5 mature cows may be carried in place of every 8 calves and 7 yearlings (Anon., 1951). In the present survey, if the 169 cows which aborted and were culled had remained in the herds, the requirements would have been 169 fewer yearlings and 204 fewer calves. This would have allowed 120 extra mature cows to be carried whose estimated production would be 34,320 lb butterfat. Thus, the total loss is estimated to be 96,058 lb butterfat which at 40d. per lb would return £16,010.

To this figure must be added a wastage loss of 433 bobby calves valued at £2 10s. each and therefore the loss due to production and wastage is £17,092. From this must be deducted the sale of 169 cull cows, at £20 each, giving a net loss of £13,712. This loss has been sustained on a herd of 36,218 cattle which is equivalent to a loss of £756,000 on 2 million cattle, the approximate size of the national herd.

The Huntly District is one where vaccination with *Br. abortus* Strain 19 vaccine has been carried out on an intensive basis for at least 15 years. It may be considered that the estimated loss (£756,000) represents a reasonably correct estimate of the annual loss which will have to be borne by the national dairy industry after the recently introduced compulsory vaccination against brucellosis has been in operation for some years.

The problem of long return intervals in cattle assumes great significance in herds where the incidence is relatively high and especially where dairy production is closely related to a concentrated two-month calving period just preceding the spring flush of pasture production. For this survey 40% of all cows with long return intervals were culled, the others either mated immediately to calve out of season, or held over to be dry for much of one year. Applying similar economic consideration to this problem as to abortions, it is estimated that long return intervals at a level of 2.3% result in an annual loss to the dairy industry of £1.5 million.

The marked decrease in the incidence of pregnancies with retained placentae from 246 days of gestation onwards probably indicates the effect of changing physiological factors, the effects of which are completed by 276 days' pregnancy. Knowledge of the anatomical processes occurring when foetal membranes are released



from the uterus suggests that these physiological factors are the same which govern the onset of normal calving and involution of the uterus. In view of these observations relating to variation in gestation length, it is suggested that pregnancies in cattle might be classified according to:

- (1) An abortion occurs before the 247th day of pregnancy.
- (2) A premature calving occurs between the 247th and the 276th day of pregnancy.
- (3) A full-term calving occurs after 277 days of pregnancy.

In many definitions regarding the termination of pregnancy the viability of the foetus has been considered. From observations made, however, it is suggested that such a criterion is too greatly dependent on other factors to be included in a meaningful definition.

In this study, premature calvings were considered to occur between days 251 and 281 of pregnancy. This would, according to Fig. 1, mean that 49.3% of all calvings were premature. The acceptance of the suggested definition would place 15.5% of the calvings as premature—a much more acceptable proportion.

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