STUDIES ON THE REPRODUCTIVE PERFORMANCE OF DAIRY COWS IN NEW ZEALAND AND SOME FACTORS WHICH MAY INFLUENCE REPRODUCTIVE EFFICIENCY

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GENERAL ABSTRACT

This thesis is comprised of a series of studies on aspects of the reproductive performance of dairy cows in New Zealand.

The studies of ovarian activity in post-partum dairy cows by ultrasound examinations were conducted in a spring- and an autumn-calving herd. This study showed that there is seasonal variation in the initiation of post-partum ovarian function in dairy cows in New Zealand, and this influences some aspects of reproduction. The interval from calving to the first post-partum ovulation in the autumn-calving herd was significantly shorter than that in the spring calving herd. Other reproductive indices were shorter in the spring-calving herd. The mean milk progesterone concentration during the dioestrous phase(Day 7-16) of the normal first cycle for cows in the spring-calving herd was significantly higher than in animals in the autumn-calving herd. In addition, the mean number of follicles in each of the follicle-size categories from 11 days before the first ovulation in spring-calving cows was significantly higher than in autumn-calving cows. There were three wave-like patterns in the mean size of the largest follicle during the first normal cycle. The patterns of the mean number of each follicle category and the mean size of the largest follicle in cows which had a shortened first cycle were similar to those seen in the first two stages of a normal first cycle. The follicular patterns in cows which had a short first cycle were also the same as those in the first stage of a normal first cycle.

The use of gonadotrophin releasing hormone(GnRH) in post-partum anoestrous dairy cows in a spring-calving herd showed that the GnRH injection could induce luteinising hormone(LH) release and ovulations. The study of ovarian activity post-injection showed that the GnRH-induced LH release was associated with an increase in average number of medium follicles(MF's) and a decrease in large follicles(LF's) in the ovaries of treated cows. Treated cows ovulated 4.7 ± 2.6 days post-injection, while only one control cow ovulated on the equivalent of Day 5 post-injection. The reproductive indices in treated cows were improved, compared with untreated controls.

Oestrous behaviour was studied in a group of sixteen Taurindicus heifers(Sahiwal x Holstein Friesian crossbreds) after oestrus synchronisation treatment by using a CIDR (Control Intravaginal Drug Release) device. It was found that these animals preferred to be mounted rather than to mount when in oestrus. The mean interval from CIDR removal to the onset of oestrus was 31.5 ± 2.3 h, with the mean duration of oestrus(8.3 ± 1.9 h). The use of visual observation in combination with tailpaint scoring could detect all oestrous animals.

The DairyMAN programme was used to analyse breeding records from two intensively managed research dairy herds. Results from analyses produced by the programme were used to monitor and compare against standard or target values. The results showed that reproductive performance in the two herds was above target values. The increase in the use of hormonal treatment such as prostaglandin $F_{2\alpha}$ to synchronise oestrus and/or to increase fertility of a herd, concomitantly with improvement in oestrus detection efficiency, resulted in an increase in submission rates and conception rates in these herds.

Nutritional supply before and after calving can reduce reproductive performance of a herd. Relatively low reproductive performances were obtained in both herds during the 1985 season in which pasture growth was badly affected by climatic conditions. This was reflected in the lower occurrence of +PMH(behavioural oestrus events recorded before the mating period commences) in the No2 herd in 1985(61%), compared with a target value of 85%, whereas the average of all 7 years was 80%. The conception rates of the herd were also affected as the first service pregnancy rate(PR) was only 43%, compared with a target value of 59%. The average of all 7 years was 56%. Relatively high reproductive performance was obtained in 1986. The submission rates(SR) at 3 and 4 weeks after Planned Start of Mating(PSM) were 94 and 100%, respectively, compared with target values of 90 and 100%, respectively. In addition, the occurrence of +PMH was high in 1986(90%), compared with a target value of 85% and an average of all 7 years(80%). The first service PR was also high in 1986(71%).

The proportional incidences of short return to service intervals(1-17 days) were high(32 to 57%) in the No1 herd which used natural mating, compared with 6 to 22% in the No2 herd which used artificial insemination.

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GENERAL INTRODUCTION

This thesis is presented as a series of projects in which some aspects of reproductive performance of cows in New Zealand dairy herds have been studied and described. It comprises four projects, and each projects represents one chapter.

The first chapter specifically describes post-partum ovarian activity in autumn- and spring-calving cows. Ultrasonic examinations were performed in these animals to study ovarian follicular activity after calving, before and after first ovulation, and during the first cycle post-partum. Ovarian follicular patterns during these periods were also obtained.

The second chapter studies the use of gonadotrophin releasing hormone (GnRH) to induce ovulations post-partum in anoestrous cows in a spring-calving herd. Follicular patterns before and after GnRH injection were monitored and reproductive performance after treatment was compared with untreated controls.

Taurindicus animals (Sahiwal-Friesian crossbred) are produced in New Zealand specifically for tropical countries in South East Asia and South America. These animals have resistance to diseases, parasites and high temperature, and acceptable milk production. Previous reports showed that Taurindicus animals preferred being mounted by other cows than mounting other cows when they were in oestrus. Oestrous behaviour was studied in the taurindicus heifers by using visual observation and tailpaint scoring. This study is presented in Chapter 3.

The last Chapter concerns the use of the DairyMAN Programme which has been designed and developed in the Department of Veterinary Clinical Sciences, Massey University, New Zealand. The programme was used to analyse breeding records collected in the No1 and No2 herds at the Ruakura Agricultural Centre , Hamilton, New Zealand. Results from reproductive analysis reports produced by the DairyMAN Programme from these two herds were assessed. Important factors such as submission rate and oestrus detection which are known to influence fertility in terms of herd breeding management were also assessed.