



# RESEARCH REPORTS



## Comparison of Two Estrus Synchronization Protocols for Fixed-Time Breeding to Increase Pregnancy in Lactating Dairy Cows

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The ability to synchronize the onset of estrus, and hence the time of breeding and calving offers economic and management benefits to dairy producers. It has been reported that almost half of the estrus period in normal cycling dairy cows may not be detected. Several researchers have linked poor estrus detection to the lower pregnancy rate obtained after breeding lactating cows. This inefficiency results in longer than optimal calving intervals, loss of milk yield, and can limit reproductive efficiency dairy herds.

In order to improve or overcome problems with estrus detection, various estrus synchronization protocols have been developed and are used in many dairy herds. Numerous researchers have shown that pregnancy rate of cattle inseminated after prostaglandin ( $PGF_{2\alpha}$ ) induced estrus is similar to or superior to that of cows inseminated after natural estrus.

Nevertheless, estrus synchronization programs must still rely on the detection of estrus for breeding, and the time estrus is noted after treatment can be variable between cows. Researchers have also examined the use of an estrus synchronization program involving fixed time breeding following two injections of  $PGF_{2\alpha}$  given 12-14 days apart ( $2xPGF_{2\alpha}$ ). However, the interval from  $PGF_{2\alpha}$  injection to ovulation is often too variable, leading to producers missing estrus and therefore to decreased pregnancy rate.

Some dairy farmers are now opting to use the "Ovsynch" protocol, which involves injecting  $PGF_{2\alpha}$  and gonadotropin releasing hormone (GnRH) to synchronize estrus as well as follicular development in relation to ovulation. This protocol has been shown to improve pregnancy rate in both beef cows and lactating dairy cows.

The objectives of the present study were to compare synchronization of ovulation, luteal function and pregnancy rate following fixed time breeding between "Ovsynch" and double injections of  $PGF_{2\alpha}$  protocols in dairy cattle.

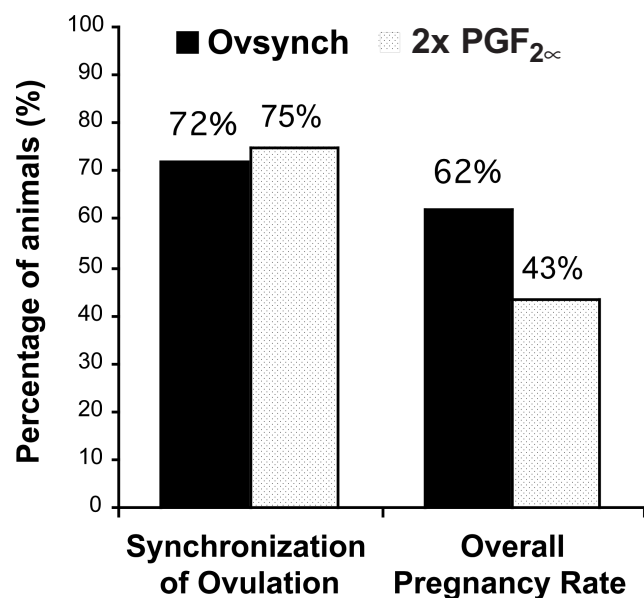


Figure 1. Percentage of cows synchronized on the day of breeding and the percentage of total cows pregnant at 60 days.

Ninety cycling dairy cows, between 60-90 days in milk were randomly assigned to either "Ovsynch" or 2xPGF<sub>2α</sub> treatment protocols. All 45 cows in the "Ovsynch" protocol were given GnRH (100 mg) and then PGF<sub>2α</sub> (25 mg) 7 days later. A second injection of GnRH (100 mg) was given 48 hours after PGF<sub>2α</sub>. All animals were inseminated 12 and 24 h after the second GnRH injection. Animals assigned to the 2xPGF<sub>2α</sub> protocol were given two injections of PGF<sub>2α</sub> (25 mg) 14 days apart. Inseminations were carried out at 60 and 72 hours after the second PGF<sub>2α</sub> injection. Milk samples were obtained from all cows on days 0 (day of breeding), 7, 14, and 21 to determine milk progesterone concentrations, which were used to assess ovulation and corpus luteum function.

Ovulation synchrony for cows within each treatment protocol was determined by determining the proportion of animals with milk progesterone level less than 1 ng/mL on the day of breeding and greater than 1 ng/mL on day 7. Pregnancy was determined by ultrasound on day 35 and then verified by rectal palpation on day 60 after breeding.

Overall the pregnancy rate was significantly higher ( $P < 0.05$ ) for "Ovsynch" treated animals (62% vs 43%) even though synchronization of ovulation was similar (75% vs 72%, respectively) between the 2xPGF<sub>2α</sub> and "Ovsynch" treatment groups. Results are shown in Figure 1. Furthermore, milk progesterone levels were not statistically different on sample days post insemination. However, day 14 progesterone levels tended to be higher in the "Ovsynch" treated cows, which is normally indicative of better functioning corpus luteum (Figure 2).

The establishment and maintenance of pregnancy, as well as embryo growth are related to the ability of the corpus luteum to secrete sufficient progesterone. The higher progesterone levels may improve uterine recognition of an embryo, thus improving pregnancy outcomes.

Researchers have reported that cows suffering from early embryo loss had significantly lower milk progesterone concentrations between days 7 and 16 post-insemination than animals that maintained pregnancy.

The pregnancy outcomes for this study are much higher than those normally found for cows that are bred to natural estrus. This is due to the elimination of estrus detection with synchronization. Another factor may be that the cows were inseminated twice versus once.

It can be concluded from this study that the "Ovsynch" protocol is a better fixed timed insemination protocol than compared to the 2xPGF<sub>2α</sub> protocol to overcome the problem of estrus detection in dairy cows and to obtain much improved pregnancy rates.

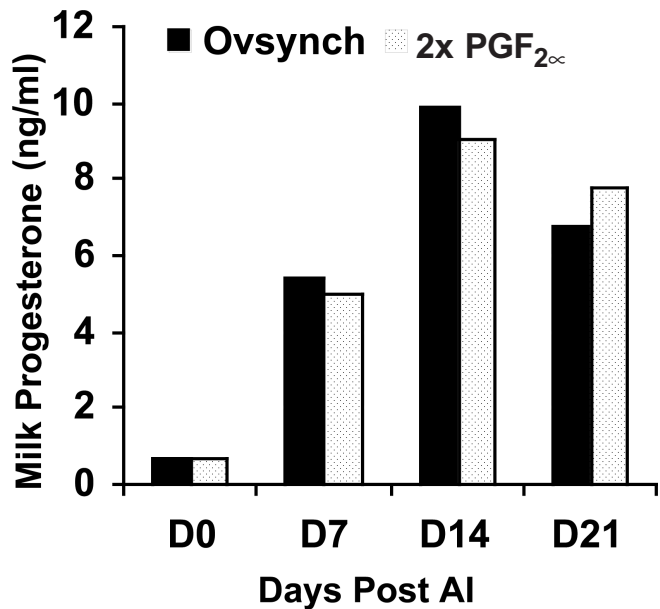


Figure 2. Milk progesterone concentrations post insemination.

This research was conducted at the UBC Dairy Education and Research Centre. Miriam Gordon is, and Mohamed Hirad was, a graduate student supervised by Dr. Rajamahendran, Professor of Animal Science at UBC. Nelson Dinn is Manager of the UBC Dairy Centre in Agassiz. This research was funded by the Natural Sciences and Engineering Research Council of Canada, and the Westgen Endowment Fund. Miriam Gordon is supported by a UNIFEED Fellowship.