

Comparison of human choriogonadotropin (HCG) and gonadotropin releasing hormone (GnRH) using a synchronized ovulation program for timed breeding

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As dairies continue to grow in size so must the means of efficient and cost-effective management. In the area of reproduction, the Ovsync program was developed by Pursley, *et al.* in order to improve pregnancy rates in cattle without the labor cost of heat detection.¹ The protocol involves the use of prostaglandin and gonadatropin releasing hormone (GnRH) at specific time intervals to induce ovulation, allowing for a timed breeding.² While these methods have proven relatively successful, the cost of such a program has been prohibitive. The use of human choriogonadotropin (HCG) in place of GnRH in the Ovsync protocol has been hypothesized to deliver similar results.

A study using HCG was conducted on a large commercial dairy in northern Colorado. Cows were grouped in pens of 150-180 by days-in-milk (DIM). The Ovsync protocol was initiated for all cows in the pen when DIM averaged 80-95. DIM at breeding ranged from 53 to 160. All cows were bred according to the Ovsync protocol. A total of 1029 cows were enrolled. Cows were assigned to one of 2 treatment groups at the time of the first injection. Every other cow encountered during injection was assigned to treatment 1 (GnRH) or treatment 2 (HCG). GnRH or HCG was administered on day 1 at 7:00 am, one week later at 4:00 pm a dose of prostaglandin F_{2α} (PGF_{2α}) was given, 48 hours later a second dose of GnRH or HCG was given and animals were bred 16-18 hours later. Animals enrolled in the HCG group received 2500 USP units IM. Those in the GnRH group received 100 µg IM at each dosing. Animals in both groups received 25 mg of PGF_{2α} IM.

Data were analyzed using analysis of variance methods and examined parity, sire, DIM at first breeding and TECHNICIAN. The overall model indicated a statistically significant influence on pregnancy outcome by treatment groups (GnRH vs. HCG), DIMFB and Technician. The results are presented in table 1. The vari-

ables DIMFB and TECHNICIAN were explored further to assess the impact of HCG and GnRH therapy. The results are presented in table 2 and 3 respectively.

Table 1.

Factors	p-value
Treatment	<0.001
Technician	0.076
Sire	0.434
Lactation	0.476
DIMFB	0.001

For the analysis of DIMFB cows were grouped into 3 categories: 1) DIMFB= 50-70 DIM, 2) DIMFB=71-95 DIM, and 3) DIMFB>95 DIM. Comparison of HCG to GnRH was done within each of these categories.

Table 2.

DIM at Breeding	#HCG Cows	#GnRH Cows	%HCG Preg.	%GnRH Preg.	p-values
50-70 DIM	58	61	10.3	13.1	0.643
71-95 DIM	226	246	17.3	30.1	0.001
>95 DIM	229	210	23.1	32.3	0.031

Analysis of technician was also done. Listed in table 3 are the pregnancy rates for each technician by treatment group.

Table 3.

Technician	# HCG Cows	# GnRH Cows	%HCG Preg.	%GnRH Preg.
1	171	186	21.6	31.2
2	80	99	12.5	22.2
3	101	106	20.8	29.3
4	78	72	23.1	26.4
5	86	62	15.1	24.2
6	18	15	22.2	33.3

Pregnancy rates for cows synchronized ranged from group averages of 12-23% with HCG and 22 -39% with GnRH. Six cohorts were used to achieve this data set. Listed in table 4 are the pregnancy rates by cohort.

Table 4.

Breeding Date	#HCG Cows	#GnRH Cows	%HCG Preg.	%GnRH Preg.
Apr.10, 1997	89	87	20	39
Jun. 5, 1997	87	92	20	24
Aug. 7, 1997	92	81	21	22
Sept. 25, 1997	78	80	20	35
Dec. 4, 1997	81	82	23	35
Dec. 23, 1997	87	87	12	30

Conclusions from this data set indicate that HCG did not perform as well as GnRH when used with the same time interval as developed for GnRH. However due to differences in half-life, a different dose or different time intervals may yield more acceptable results. Additionally, this data set indicates poorer pregnancy rates for both GnRH and HCG when used for synchro-

nizing animals under 70 DIM (table 2). Table 3 presents the data by technician and shows the individual pregnancy rates. Technicians 2 and 5 had significantly lower pregnancy rates due to inexperience of breeding dairy cattle and breeding animals in which ovulation was synchronized and not estrous. Size of synchronized groups may also influence pregnancy rates. Earlier work with GnRH at this facility showed that pregnancy rates might be higher when groups of 40-70 animals are used. Groups larger than this become logistically cumbersome and difficult to manage for typical farm personnel.

References

1. Pursley JR, Kosorock MR, Wiltbank MC. Reproductive management of lactating dairy cows using synchronization of ovulation. *J. Dairy Sci.* 80:301
2. Pursley JR, Wiltbank MC, Stevenson JS, Ottobre JS, Garverick HA, Anderson LL. Pregnancy rates per artificial insemination for cows and heifers inseminated at a synchronized ovulation or synchronized Estrus. *J. Dairy Sci.* 80:295.