

Chances Aren't Richard Pursley

The ration is tweaked, once again. The cows are transitioning well through calving time. Cows are peaking in milk production better than ever. It's fall and the weather is beautiful. So why is it so darn hard to get cows pregnant? Aside from the cows with health problems, i.e., severe lameness, uterine disorders, mastitis, rumen disorders, etc., all the rest have no excuse. Right? Unfortunately, chances are even the majority of healthy cows will not become pregnant following a 1st service artificial insemination (AI). Fertility of dairy cattle is on the decline and is the # 1 reproductive problem facing dairy producers. Since 1970, yearly average 1st service conception rates (probability of a pregnancy to one AI) decreased from about **60 %** to a current value of about **37 %** (Spalding et al., 1974; Peters and Pursley, 2002). The physiological reason(s) for the decrease in fertility is not well understood.

The # 2 problem affecting pregnancy production is low estrus detection rate, i.e., not allowing cows enough chances to become pregnant. Recent DHIA data from Michigan herds indicate that in each 21-day period following a voluntary waiting period only 35 % of cows were given the chance to become pregnant. Only 6 % of herds had an average service rate of more than 60 %. What is the secret to their success? Most of these herds are using a timed-AI program to improve service rate. They understand that in order to improve pregnancy production, it is imperative to have control over first and subsequent AI. The alternative is letting the cow control time of 1st AI and as DHIA data indicate, this is not very efficient. Currently, the only way to attack this problem, and maintain a reasonable percentage of the herd pregnant without severe culling and costly purchases of replacements, is intensive management of timed-AI.

What is intensive timed-AI management? It is making sure that: 1) all cows receive an AI during the 1st week following voluntary waiting period, 2) all cows that received an AI are diagnosed for pregnancy no later than 33 to 39 days later, 3) all cows diagnosed not-pregnant receive a subsequent AI within the next 10 days, and 4) all cows diagnosed pregnant are re-checked 1 month later to find cows that have lost their pregnancy.

Intensifying management of first services

Current synchronization of ovulation technologies are based on the Ovsynch protocol (Pursley et al., 1995, Pursley et al., 1997a, Pursley et al., 1997b, and Pursley et al., 1998; Figure 1). The original Ovsynch protocol still appears to be the most effective timed-AI program. Ovsynch allows for similar conception rates compared to AI following a detected estrus and Ovsynch substantially increases numbers of cows pregnant by 60 and 100 days in lactation (Table 1). Ovsynch also gives producers the opportunity to AI all cows during the first week following voluntary waiting period. Here's how Ovsynch works: First, a list of eligible cows for breeding should be generated every week. Eligible cows for first service are defined by the voluntary waiting period. Since Ovsynch is a 9 or 10 day program, cows should begin Ovsynch during the last week of the voluntary waiting period. For instance, if the best time to

breed cows is on Thursday mornings, start Ovsynch on all eligible cows with the first injection of GnRH on a Monday. The PGF_{??} would be administered the next Monday, and subsequently, the 2nd GnRH on Wednesday and AI Thursday a.m. This is an example of a 10-day program. There is flexibility in the Ovsynch protocol. The 2nd injection of GnRH may be given anytime between 36 and 48 hours after the PGF_{??} injection. And, AI can be performed anytime between the 2nd injection of GnRH and 24 hours later (Pursley et al., 1998). Differences in calving rates were minimal during that period (Table 2). In addition, two studies now indicate that AI at the same time as GnRH may increase numbers of heifers born.

It is important to note that not all cows treated with Ovsynch will have a synchronized ovulation. Approximately 10 to 15 % of cows treated will not synchronize. The majority of cows that do not synchronize will be in estrus on the day before, or the day of, the PGF_{??} injection. Heat-detection devices can help aid the detection of estrus in these cows. If cows are detected in estrus at this time it is advised to breed these cows and remove them from the Ovsynch program. Fertility should be normal in these cows. It is also advisable to use heat-detection devices to aid heat detection around the 21-day period following AI and breed as many of these cows as possible. Remember, if only 35 % become pregnant (average conception rates) following one AI, there should be 65 % back in estrus approximately 21 days after the first AI.

Early Pregnancy Diagnosis and Re-synchronization

Early diagnosis of pregnancy is critical in an intensive AI management program. The sooner that cows can be confirmed “open” the sooner further action can be taken to re-inseminate. Instead of thinking about herd health day as primarily pregnancy checks, think about them as “open” checks. Cows that are identified “open” must be re-synchronized ASAP. In fact, several studies are in progress to test the effectiveness of early re-synchronization of cows beginning 1 week before “open” check. An injection of GnRH is given to all cows 1 week prior to “open” check. Cows diagnosed “open” (1 week later) would receive the PGF_{??} on that day, GnRH 2 days later, followed by AI. In this scenario, “open” cows could be re-inseminated 2 days after being diagnosed “open.” It is important to note that careful handling of hormones is essential. GnRH (Cystorelin, Factrel, Fertagyl, and OvaCyst) is OK to give to pregnant cows. PGF_{??} (Lutalyse, Estrumate, and Prostatae) **is not!** These PGF_{??} products will abort an early pregnancy.

To push the envelope even further, some veterinarians are now using ultrasound to determine pregnancy status between 24 and 28 days post-AI. Ultrasound technology is becoming more user friendly every day. Lightweight, portable machines with battery packs and with good resolution are now on the market. However, they are not cheap. Even though veterinarians would most likely require greater fees using ultrasound, it is certainly something to consider in the future.

Re-checking Pregnant Cows

It is very important to re-check all cows diagnosed pregnant at the “open” check. Our first study of this kind (Pursley et al., 1998) indicated significant pregnancy losses occurred following an early pregnancy diagnosis at 28d post AI (Table 2). In a

subsequent study, % pregnancy losses were similar to the first study and the greatest % loss was between 28 and 56 days post-AI. Therefore, in order to identify these “open” cows, it is critically important to re-determine pregnancy status approximately 1 month following the first check.

In summary, intensive timed-AI management allows complete control over time of 1st and subsequent inseminations. Conception rates using Ovsynch are similar to breeding following a visually detected estrus. However, pregnancy rates (estrus detection rate x conception rate) of Ovsynch are nearly twice that of estrus detection/am-pm breeding because of the low estrus detection rates in lactating dairy cows. Intensive timed-AI management necessitates aggressive pregnancy diagnosis programs to identify early pregnancies and subsequent embryonic losses. Adhering to this program will increase numbers of pregnancies per month, thereby reducing reproductive culls and the dependency on replacement purchases.

Table 1. Median days to 1st and 2nd AI, conception rates (CR) at 1st and 2nd AI, percent pregnant at 60 and 100 days postpartum (PP), and median days to conception in lactating dairy cows inseminated after a detected estrus (control) vs. timed insemination after synchronization of ovulation (Ovsynch).

Treatment	1st AI (n=298)		2nd AI (n= 163)		% Pregnant		Median days to conception
	d PP	CR (%)	d PP	CR (%)	60 d PP	100 d PP	
Control	83	39	128	45	5	35	118
Ovsynch	54	37	96	42	37	53	99

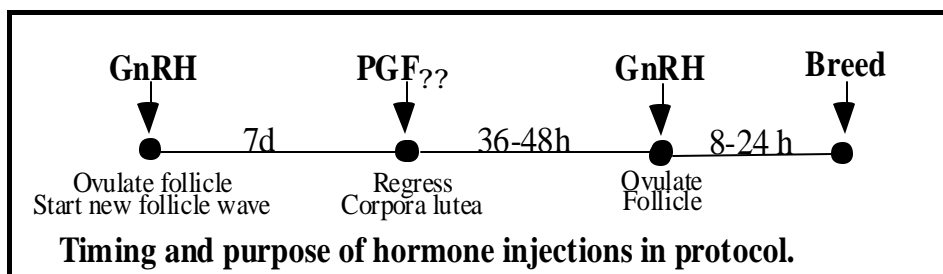


Figure 1. The Ovsynch protocol: Timing and purpose of hormone injections to synchronize ovulation in lactating dairy cows.

Table 2. Measures of fertility in lactating Holstein cows inseminated at specific times in relation to a synchronized ovulation (Ovsynch) and pregnancy diagnosed 28 days post-AI (n=732).

	Treatment Groups (h from 2nd GnRH)				
	0	8	16	24	32
Conception rate (%)	37	41	45	41	32 ^a
Pregnancy loss (%) ^b	14	21	21	21	32 ^c
Calving rate (%)	32	34	36	32	23 ^a

a - Different ($P < 0.05$) when compared to other groups within row.

b - Percent pregnancies lost between 28 d post-AI and calving.

c - Different ($P < 0.10$) when compared to other groups within row.

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