

# Fundamental Considerations for the Implementation of Timed Artificial Insemination Protocols

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The ovsynch protocol has been around for more than 10 years. Although the fundamentals of the protocol remain the same, several variations in the timing of hormone administration and A.I. have been tested in an attempt to optimize it. This article will review some of these variations and identify some considerations for the implementation of these protocols in lactating dairy cows.

## Protocol Basics

The first GnRH induces ovulation and promotes formation of a new corpus luteum (CL) and a new follicular wave; i.e. to reset the cow. The prostaglandin, given 7 days later, regresses the new CL. The second GnRH, given 48 hours later, induces ovulation of the new follicle. In the classic ovsynch protocol (shown in Figure 1), timed A.I. (TAI) occurs 16-24 hours later or before the expected time of ovulation (approx. 24 to 34 hrs after the second GnRH).

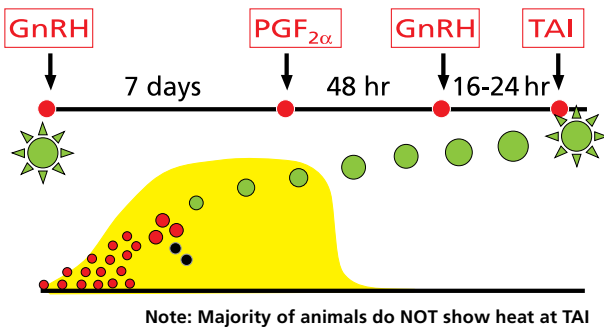
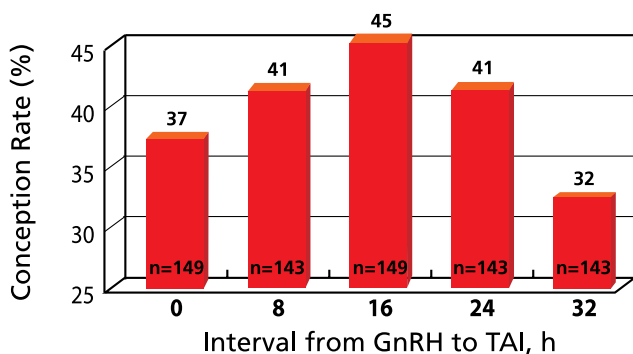


Figure 1. The classic ovsynch protocol

## Variation 1 - Cosynch

When producers started using ovsynch, one of the first questions was: Would there be any difference in conception rate (CR) if TAI is applied at varying times in relation to the second GnRH? To answer this question, a series of studies were conducted where TAI occurred at the same time as the second GnRH (0 hours or cosynch), 8 hours, 16 hours, 24 hours, or 32 hours after the second GnRH.

Results suggested cows TAI 16 hours after the second GnRH obtained the best CR. Therefore; it was recommended to use TAI 16 hours later in the classic ovsynch. The results also suggested that in cows TAI at the same time as the second GnRH (cosynch) or 32 h after, CR was lower (Figure 2).

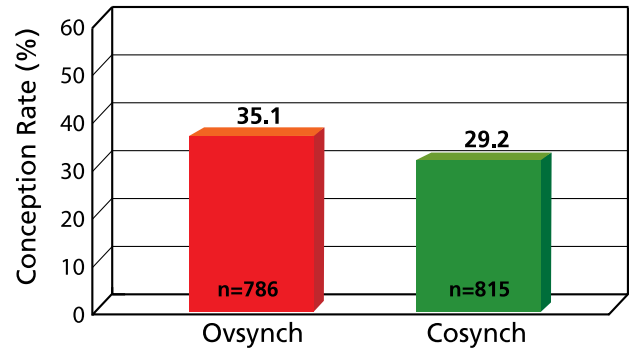


Pursley et al., 1998

Figure 2. CR according to TAI schedule

Today, more research data suggests no CR differences for cows TAI at 16 or 24 hours after the second GnRH.

Also, it is more evident that cows TAI at the same time as the second GnRH (cosynch) usually have lower CR than cows TAI 16 to 24 hours after this injection (classic ovsynch). Figure 3 shows a difference of ~5%.



Wilbank - University of Wisconsin-Madison, 2006

Figure 3. Ovsynch and cosynch CR

## Variation 2 - 72 Hour Cosynch

The 72 h cosynch was developed in 2004 at Kansas State University. In this protocol cows receive the second GnRH and are TAI 72 h (3 days) after prostaglandin treatment. The rationale is to give an extra day for follicular growth that might allow additional oocyte maturation and the ovulation of a larger follicle (Figure 4).

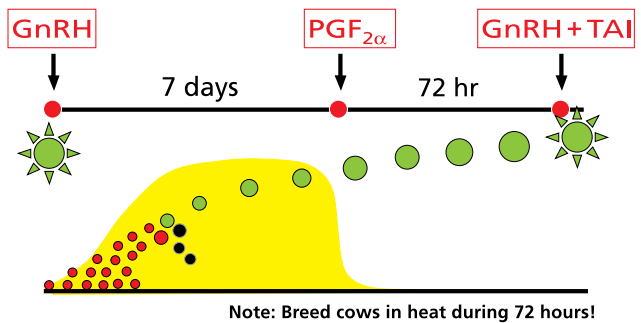
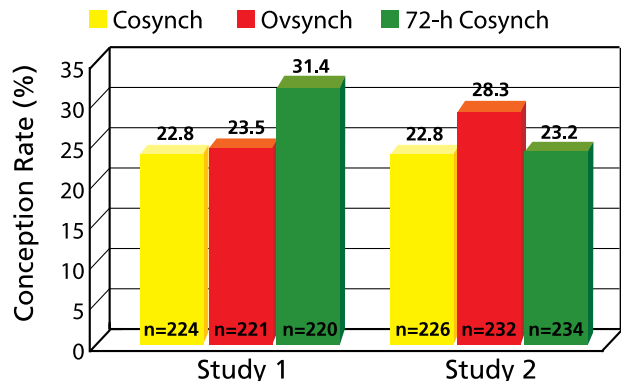


Figure 4. The 72 h Cosynch



Portaluppi and Stevenson, 2005-2006

Figure 5. CR for different TAI protocols

Results obtained with this protocol vary among reports (Figure 5). CR is optimized when this protocol is used in combination with a sound heat detection program (recommended with any TAI program but appears to be more critical for 72 h cosynch). Studies have reported between 38 and 51% of cows showing estrus on the second day after prostaglandin treatment.

Take into consideration cows showing heat during the protocol need to be detected and inseminated otherwise it could be too late for some cows when they receive TAI the next day. Thus this protocol should mainly serve as a clean-up insemination for cows not previously detected in estrus.

### Variation 3 - 56 Hour Ovsynch

The 56 h ovsynch was developed recently at the University of Wisconsin-Madison. In this protocol cows receive the second GnRH 56 h after prostaglandin treatment and are TAI 16 h after the second GnRH. The rationale is to give extra time for follicular growth and to optimize the time of A.I. in relation to the second GnRH treatment (Figure 6).

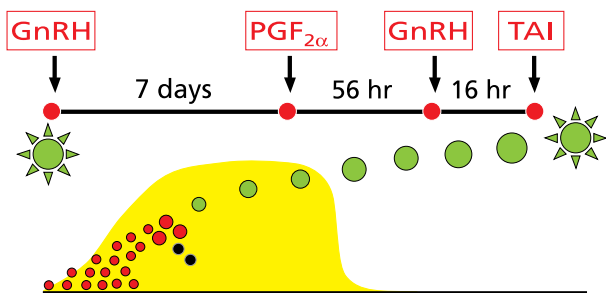
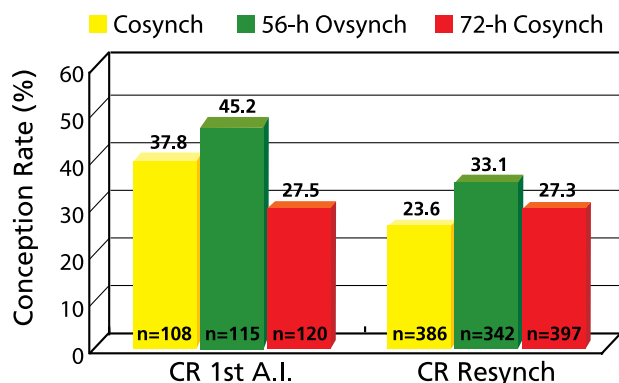


Figure 6. The 56 h Ovsynch

Currently there is only one study reporting CR for this protocol. In this study no heat detection was performed; those cows TAI with the 56 h protocol obtained the best CR for both first service and resynchs. Cows TAI with the cosynch protocols (48 and 72 h) obtained lower CR. Even though there is only currently one study, the results look promising (Figure 7).



Brusveen et al, 2006

Figure 7. CR for different TAI protocols

The main consideration for the 56 hour protocol is that the second GnRH injection must be given to cows at a time that probably will not fit within a regular herd reproductive management schedule (i.e. afternoons or early nights when cows are usually not locked up). Therefore it is very important to evaluate if the injections can be given at the right times before adopting this protocol; otherwise the change in routine could create an issue with injection compliance and lead to disappointing results. An option for the second GnRH administration could be to give the injections as cows leave the parlor, in the return lanes.

## Optimizing Protocol Results

Unfortunately there is not a “perfect protocol” that can be used across all dairies. What might work on one dairy might not work on the dairy down the road.

Some protocol considerations to help optimize results are

- In ovsynch the recommended times are 48 to 56 hours between prostaglandin treatment and the second GnRH; and 12 to 24 hours from the second GnRH to TAI.
- Cosynch is the protocol with the lowest CR. Consider double breeding (applying a second A.I. 24 hours after the first TAI) or breeding the next day.
- The 72 hour cosynch protocol can be used to obtain good results if it is combined with a sound heat detection program.
- Of all protocols discussed, the 56 hour ovsynch may optimize CR. However; this protocol requires one treatment to be given at a time when cows are not normally handled for reproductive management which could create compliance issues.

Regardless of what protocol is used there are some fundamental considerations that would determine the success of any TAI program. These include:

- Compliance. Positively the most important condition that determines the efficacy of a protocol. If the injections are not given at the correct times or not given at all the protocol will not work.
- Cyclicity. In general non cycling cows do not respond well to TAI protocols. In a situation with a high incidence of anovular cows the inclusion of a CIDR within the protocol should be considered.
- Days in milk (DIM). Although it is known cows with good transition can efficiently conceive to a natural estrus starting around 50 DIM, most data suggest TAI should not be done before 75-80 DIM. This might be associated with high incidences of anovular cows before 70 DIM.
- Education of personnel. It is imperative the people in charge of giving the injections understand at least the fundamentals of the program so they realize the importance of compliance.
- Hormone handling. Follow label recommendations for dosage, administration route, and storage. Keep hormones refrigerated if required and do not expose them to extreme cold or heat.
- Hormone administration. Use correct syringes and needles. Typically 16- or 18-gauge needles by 1 1/2 inches long for intramuscular injections. Use single dose syringes if possible. Review the injection technique with your on-farm veterinarian frequently.
- Monitoring. Results of the protocol need to be periodically monitored to determine if it needs to be adjusted or investigated. Blood progesterone testing is an effective tool to evaluate cyclicity and synchronization efficiency of any TAI protocol. 🐮

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