Seven Surefire Ways to Improve Fertility of Dairy Cows

Dr. Richard Pursley

Poor fertility of lactating dairy cows significantly challenges most dairy producers. In most herds conception rates of cows are at best about ½ that of heifers. It is not clear what culprits are primarily responsible for this problem. But, what is clear is that whatever factors are responsible for this decreased performance likely has an effect on one of three reproductive parameters: the sperm, the egg, and/or the uterine /oviductal environment. Until solutions to this problem are found, there are a number of time tested methods to help maintain optimal reproductive success. This article outlines seven surefire ways to get the most from one unit of semen.

1) Thaw straws properly! It is imperative that semen is thawed according to the recommendations of the AI organization that processed the semen. Most AI organizations recommend thawing ½ cc straws for approximately 45 seconds in a 95 to 98? F water bath. The percentage of motile sperm in a straw slowly decreases with time spent in the water bath and from loading to deposition in the cow. Do not thaw more straws of semen than you can deposit into cows in a 15 minute period (from the time the straw is loaded into the AI gun until deposited into the uterus). If thawing multiple units of semen, be sure that straws stay separated in the thaw bath. Be sure to keep the straw "thermal neutral" from the time it is removed from the thaw bath until placed into the cow. Cold shock can dramatically reduce the percentage of live motile sperm deposited into the uterus.

2) Is she or isn't she ready to breed? Cows that are not in heat (if using daily heat detection) or did not synchronize (if using Ovsynch) have no chance to become pregnant. To improve heat detection, use heat detection aids such as tail paint, chalk, or devices that change color when mounted (1). Using aids in addition to keen observation increases the chances of a pregnancy.

To maximize synchronization rates with Ovsynch (2) give the injections of both PGF?? and GnRH deep intramuscularly. In nearly all the research trials with Ovsynch, our experience indicates that injecting in the semitendinosus muscle (back of rear legs below the pin bones) with a 1 ½ inch, 20-gauge needle minimizes injection error. Be sure cows are restrained when giving injections. Needless to say, be sure the injections are given at the proper times: Inject GnRH, then 7 days later inject PGF??, then 36 to 48 hours later inject the final GnRH. Do not extend the time between PGF?? and GnRH to 72 hours. In certain situations, this extended time may result in a decrease in fertility.

3) Inseminate cows at the optimal time prior to ovulation. Insemination of cows approximately 12 hours prior to ovulation results in the greatest conception rates. Cows ovulate approximately 28 hours after either first standing estrus or the final GnRH of Ovsynch. This means that cows detected in estrus by visual observation should still be inseminated by the AM-PM rule. In cows that are synchronized with Ovsynch (GnRH, 7 d later PGF??, then 48 h later GnRH), inseminate 16 hours following the final GnRH for maximal fertility.

4) AI technique. Site of sperm deposition has an effect on fertility of lactating dairy cows. Semen should be deposited either in the uterine body or divided between uterine horns. Data from Dr. Ray Nebel's lab at Virginia Tech (3) indicates that depositing semen in the cervix reduces fertility by approximately 20 %. We have generated data from several farms in Michigan that would indicate deep uterine horn AI increases fertility. In a collaborative study with Dr. Michael Diskin in Ireland, deep uterine horn AI increased fertility in lactating Holstein dairy cows. Interestingly, there was an effect of inseminator. Some professional inseminators consistently increased fertility, some had no effect and one actually decreased fertility with deep uterine horn AI. This study had sufficient numbers of cows to interpret the impact of each inseminator on fertility. We initially thought that depositing the sperm into the most anterior part of the uterine horns would provide the best results. To achieve this, however, the uterine horns would have to be manipulated quite extensively. We now caution against using too much manipulation. Instead, deposit the semen as deep as possible with minimal manipulation. Simply lifting underneath the tract to straighten the horns may be enough to reach the greater curvature of both horns (splitting the unit of semen between horns).

5) If possible, incorporate high fertility bulls into your mating program. It is important to note that selection of high fertility bulls should be secondary to selecting bulls based on Net Merit $ (see Dr. Kathy Lee's article in the July, 2004 MDR). To have an impact on fertility, we recommend using bulls with +2 or higher estimated relative conception rate (ERCR) value with repeatability > 90 %. Finding ERCR values on bulls is easy. Go to: http://www.drms.org/sire.htm.

6) Reduce summer heat stress. Summer heat stress clearly lowers conception rates, even in the northern tier of states (well, maybe not this year). Fans are a must in free-stall barns. Sprinkler systems should be considered in cases of extremely hot weather. Misters are not recommended for climates like Michigan where humidity can be a problem.

7) Use CIDRS in non-cycling cows in the breeding group that are being timed-inseminated with Ovsynch. CIDRs are progesterone releasing devices that are inserted into the vagina of cows to help induce non-cycling cows to cycle. CIDRs appear to improve fertility in non-cycling cows that are timed-inseminated using Ovsynch. One of the primary reasons for low herd fertility when using Ovsynch is that too many non-cycling cows are in the breeding group. Non-cycling cows have lower conception rates on Ovsynch compared with cyclic cows. To identify non-cycling cows we recommend that the herd veterinarian routinely check Ovsynch groups within 2 weeks prior to starting Ovsynch. If cows are not diagnosed with a functional or regressed corpus luteum (CL), they should receive a CIDR at the time of the 1st GnRH of Ovsynch. The CIDR should then be removed 7 days later at the time of the PGF?? injection. In non-cycling cows placed on Ovsynch, an improvement of 10 to 15 % in conception rates can be expected when using CIDRs.

My laboratory is currently working on two different hypothetical questions to better understand the fertility problem of dairy cows: First, do dairy cows retain sufficient numbers of sperm following artificial insemination (AI) to allow for normal fertility? Many cows struggle to have normal uterine involution following calving. A healthy uterine and oviductal environment maximizes sperm transport, and thus optimizes the chance that the ovulated egg is fertilized. Poor uterine health is likely a "road block" that minimizes the number of sperm that make it to the utero-tubal junction prior to the time of ovulation, which may minimize fertilization success. And secondly, is fertility of the egg compromised in lactating dairy cows compared with that in heifers? The egg is housed in a follicle until ovulation. We now know that follicle growth, and the hormonal environment the egg is subjected to, is different in cows compared with heifers and could be a key limiting factor in dairy cow fertility (4).

These questions and many more by other researchers will someday lead to ways to improve conception rates in lactating dairy cows. Even though the scientific community has not found the silver bullet to cure the fertility woes of dairy cows, there are still a number of proven strategies that can help maintain maximal fertility of dairy cows.

References

1) Foote, R.H., Estrus detection and estrus detection aids. J Dairy Sci, 1975. **58**(2): p. 248-56.

2) Pursley, J.R., M.O. Mee, and M.C. Wiltbank, Synchronization Of Ovulation In Dairy Cows Using PGF??and GnRH. Theriogenology, 1995. **44**: p. 915-923.

3) Williams, B.L., et al., Impact of site of inseminate deposition and environmental factors that influence reproduction of dairy cattle. J Dairy Sci, 1988. **71**: p. 2278.

4) Sartori, R., et al., Fertilization and early embryonic development in heifers and lactating cows in summer and lactating and dry cows in winter. J Dairy Sci, 2002. **85**(11): p. 2803-2812.