

USING THE LATEST TECHNOLOGY TO SHORTEN THE CALVING INTERVAL

Steve Washburn, PhD
Extension Specialist, North Carolina State University
Email: steve_washburn@ncsu.edu

In the past 25 years, we have observed that conception rates have declined while average days open and calving intervals have increased markedly. In 532 Holstein and 29 Jersey herds continuously on DHI in 10 Southeastern states, conception rates declined from about 52 or 53% in the late 1970s to about 33 to 35% in the late 1990s. Average days open increased from under 125 days in the late 1970s up to about 170 days in Holstein herds and 150 days in Jersey herds by the late 1990s. Those numbers correspond to calving intervals increasing from 13.3 months to 14.1 months for Jerseys and to 14.5 months for Holstein herds. Much of that observed change has been in the past 15 years. Similar trends have been reported in other areas of the country. Also, dairy farmers and researchers in other countries have documented poorer fertility and higher culling for reproductive failure when using sires of North American genetics. This is particularly noticed in countries where seasonal breeding and calving is practiced to match pasture-based milk production.

Our genetic selection programs have either ignored or selected against reproductive efficiency. Even though heritability of reproduction is low, there have been reported to be negative genetic correlations between milk yield and reproductive traits such as calving interval, days open, days to first service, and first-service conception rates. In fact, the sire selection system as it

exists now favors sires whose daughters are slower to breed back. By breeding back later, such cows milk relatively more and the sire gets a better proof. Differences of 85 days open versus 140 days open can mean a difference of 385 pounds of milk in first lactation or about 580 pounds in second lactation in favor of the sire whose daughters were open only 55 days more. Another genetic factor has been the increasing percentage of inbreeding within our populations of dairy cattle.

More intensive monitoring of cattle of high genetic merit has revealed that there have also been physiological changes that have accompanied increasing milk production potential. The amount of progesterone circulating in blood from high merit cows is lower due to lower production of progesterone by the corpus luteum and perhaps, in part, due to a faster clearance rate for the very metabolically-active high producing cows. Delayed onset of postpartum estrous cycles and irregular estrous cycles have been reported at higher frequencies than previously noted. Irregular estrous cycles may be indicative of increased embryonic loss. Such high producing cows may also have reduced immune function and inability to effectively combat disease. Certainly, it has been well documented that cows that have difficulty calving or that have reproductive tract infections, mastitis, or metabolic disorders in early lactation have a much lower

probability of rebreeding in a timely manner.

The physiological changes that have accompanied genetic selection programs in the past may make the current dairy cow population more susceptible to other management and environmental factors that could lower reproductive performance. Such factors could include nutritional stressors such as nutrient imbalances, inadequate energy due to lower quality forages, or perhaps mycotoxins or other antiquality components in concentrate or forage sources. Environmental heat stress seems to have both acute and chronic effects in that conception can be reduced for up to two or three months after periods of high temperature and humidity.

Other changes in the US dairy industry are worth noting. There have been studies in the US and in Israel that indicate that longer (14.5 to 15.5 months) calving intervals can be just as or perhaps more profitable than striving for shorter (12.5 to 13.5 months) calving intervals in herds calving and producing milk year around. With availability of bST, cows can be expected to be productive for reasonably long lactations and some producers adopt such a strategy. In some studies, onset of bST along with using the Ovsynch method of synchronizing estrus has shown to improve conception rates among cyclic cows. Because herds have gotten larger, there is more concrete (less mounting activity) and more hired workers are involved and estrous detection accuracy has become an issue which is why many producers have experimented with regimens to synchronize estruses. There also used to be professional technician inseminators available to most farms but now it is much more common for inseminators to be part of each farm's staff

and there can be much variation in their insemination skills.

Specific reproductive strategies to consider:

Facilitated estrous detection: (Electronic mount detection (HeatWatch) or use of pedometers. Specific individual(s) with responsibility to monitor heat activity.) Heat Watch works well but requires time to manage. On slippery concrete, mounting is reduced and false mounts can occur on cows in freestalls. HeatWatch has worked well when cows are allowed off concrete for exercise or to go to pasture but all estrous detection is likely to improve off of concrete. Pedometers are not specific as the amount of walking can vary greatly among cows that are not in heat and therefore, should be used with observation. Extra help must be dedicated and trained in accurate heat detection but the job can get boring. Use of patches or tailhead paint help identify cows in heat but require management and follow-up observation. A goal of a good estrous detection program would be to catch all repeats in heat before time for palpation for pregnancy - perhaps not easy or likely but the veterinarian should not be your estrous detection program!

Estrous synchronization: Tools include prostaglandins (Estrumate and Lutalyse), GnRH (Cystorelin and Fertygyl), and soon (late in 2002) the Controlled Internal Drug Release (CIDR) device that is used intravaginally to release progesterone. Estradiol Cypionate has also been used in some experimental regimens. There are a number of regimens that vary in efficacy depending upon the status of the animals and management of the system. Usually, conception rates are slightly lower than breeding based on natural estruses with timed inseminations having lower

conception than breeding at estrus after synchronization. Cyclic animals consistently respond better than anestrous cattle to synchronization regimens. The other issue is that usually fewer than half and sometimes fewer than one-third of cows conceive and estrous detection or other measures are needed to catch repeats on a majority of cows.

Crossbreeding: Use of Jersey sires or perhaps other breeds can eliminate inbreeding effects and can result in potentially positive effects on survival traits such as fertility and longevity in the herd. More data are needed from controlled studies and from contemporary comparisons in commercial herds in order to make improved recommendations but we expect to see more crossbreeding in dairy herds in the future. There may also be advantages in calving ease, and calf survival for crossbreeding, as well as increased milk solids in markets that are paid on milk components.

Summary

It seems that our selection system in the United States has led to highly productive dairy cows that can be reasonably fertile under optimal conditions; such cows, however, may be more susceptible to nutritional and environmental stressors leading to compromised reproductive performance on many commercial farms. Changes in management practices such as intentional delayed breeding and less aggressive estrous detection can accentuate such results.

Because of differing farm goals and herd management approaches, specific strategies on reproductive management may differ from farm to farm. Some herd managers may choose to concentrate on high production with long lactations and not be as concerned about reproduction. In some cases, this may include purchasing replacement heifers routinely to maintain herd size or perhaps

using induced lactations to keep infertile cows productive. Other producers may choose to aggressively review management strategies and initiate operating procedures of estrous detection and/or estrous synchronization to improve reproduction. Herd managers interested in seasonal breeding and calving may also need to consider the genetic components of a herd reproduction system. Longer term, it may become very important to include measures of reproductive performance routinely in genetic selection indices in order to slow the rate of reproductive decline.

