

# Fertility potential: the bull + the cow + the inseminator + the environment



The success of any artificial insemination program is dependent on numerous factors. Success starts with a bull that is healthy, disease-free, and produces ample quantities of high quality semen. However, equally important is the fertility potential of the female, competency of the inseminator, and quality of the environment. Each of these components must be maintained at high standards as maximum reproductive efficiency will be a function of the weakest link.

## THE BULL

It has long been recognized that a major benefit of A.I. is the reduced risk of disease transmission. However, A.I. can be a very efficient means to spread disease if attention is not paid to the health status of the donor sires. Major A.I. centers that are members of Certified Semen Services (CSS) go to extensive lengths to ensure each dose of semen is safe and disease free. The average bull in a major A.I. center may receive 30 or more health tests in a given year while screening for 12 or more different diseases. Although semen processed on-farm or by non-CSS custom-collection centers “may be” equally safe, there are no guarantees and the risk will almost always be much greater than with sires residing in CSS approved A.I. facilities.

Bulls with sufficient health status to qualify as semen donors must also produce semen of acceptable quality to achieve

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normal conception potential. Bulls at major A.I. centers are critically scrutinized for semen quality on each collection day using state of the art technologies in semen evaluation. Samples of less than acceptable quality are discarded. Bulls that continually produce substandard quality ejaculates, perhaps due to illness or adverse weather conditions, may be temporarily removed from the collection schedule. Some sires are simply culled from the program. These procedures ensure that only highly fertile semen makes it to the salable inventory. As a result of these intense A.I. center quality control procedures, the variation in A.I. sire conception rate is extremely small. As estimated by both Agritech Analytics and the United States Department of Agriculture-Animal Improvement Programs Laboratory (USDA-AIPL), greater than 90 percent of “all” A.I.



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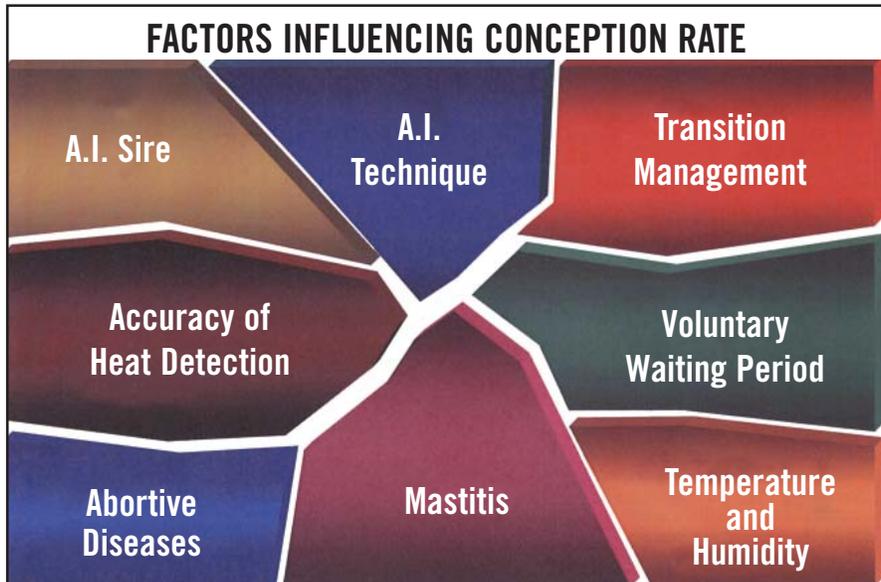
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sires (progeny test and inactive included) have a fertility deviation that is  $\geq -3$  percent of average fertility. However, when you consider the Active A.I. list from which semen is actually available for purchase, greater than 98 percent of sires will meet this threshold.

Because of the transient nature of both semen quality and sire health status, A.I. will always have an advantage over natural service sires. Although a breeding soundness exam can be used to ensure a natural service sire is fit to breed cows, semen quality can change dramatically in a relatively short period of time. Research has shown that 48 hours exposure to mild heat stress can affect semen quality for eight weeks or more. Exposure of natural service sires to one infected female can change health status permanently. Bulls in major CSS approved A.I. centers basically receive a breeding soundness exam with each and every collection which is often multiple times weekly. No matter how intense, no on-farm natural service sire management program can compete with CSS approved A.I. centers in terms of delivering high-quality and disease-free semen.

### THE COW

No matter how good the semen quality, semen has no therapeutic effect to “cure” fertility problems in the cow. Cows that experience any type of health problem are predisposed to reduced conception rates. Cows that experience one health problem have increased susceptibility to other health conditions, which then compounds the degree of difficulty in getting them rebred. For example: cows that get



milk fever have an increased probability of experiencing ketosis, a displaced abomasum, metritis, mastitis and cystic ovaries than cows that do not get milk fever.

When cows experience health and reproductive problems, we want to find a magic potion that can be applied to fix the problem “today.” However, today’s fertility is a reflection of the cow’s environment and management during the previous two or three months. Similarly, the decisions made today can affect cow fertility for several months to come.

There is no single factor that affects cow fertility more so than nutrition. Additionally, there is probably no period or factor in a cow’s reproductive lifecycle that is more neglected than her nutrition program during late-lactation. The incidence of fresh cow problems is heavily dependent on the quality of the transition cow program. The quality of the transition cow program depends heavily on the quality of the cows at the time they are dried off. In a well managed herd, cows will enter and exit the transition cow program in a body condition score of



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3.25 to 3.75. When cows enter the dry pen over- or under-conditioned, the nutrition program must ramp-up or down to get cows in optimum condition before calving. Forcing cows to change body condition during the dry period is never a good thing. A comprehensive nutrition and body condition scoring program throughout the cow's reproductive lifecycle is essential to ensure that each step adequately prepares cows to move on to the next step.

### THE INSEMINATOR

When we discuss inseminator competence, we usually focus on issues like semen handling and A.I. technique. Can they retrieve semen from the tank without damaging semen that remains in the tank? Can they thaw semen, load an A.I. gun and arrive at the rear end of the cow with semen that is still alive and viable? And finally, can they proficiently manipulate the gun through the cervix and precisely deposit semen in the uterine body? It's true, each of these factors are important, however no attribute of inseminator competence is more important than: Can he accurately identify cows that are truly in estrus and ready for insemination? In many of today's large dairies, the breeding philosophy is: "Stick a dose of semen in her just in case." This practice is not only wasteful, but it can actually be counter productive. Research has shown that cows that are pregnant less than 25 to 30 days have a 90 percent probability of abortion if mistakenly reinseminated. Some herds can improve conception and pregnancy rates simply by taking a more conservative approach to estrus diagnosis.

Proper timing of A.I. is also an important component of inseminator efficiency. It's not enough just to put semen in a cow that is in heat. The timing of A.I. must ensure that the fertile life of sperm and egg will overlap. Frozen-thawed sperm survive approximately 20 to 24 hours in the female reproductive

tract. However, the fertile life of an unfertilized ovum is only six to eight hours after ovulation. Since ovulation occurs 25 to 32 hours after the first standing mount, ideal timing is to A.I. four to 14 hours later. However, it is important to distinguish the difference between "first standing mount" and "first **observed** standing mount." In today's large dairies, cows are often only locked-up at a single time each day, which diminishes the opportunity to A.I. at "the right time." A once daily A.I. program must simply appreciate that many cows will be bred too early and must be rebred if they are still standing for an extended period of time.

Hygiene is an over-looked attribute of inseminator proficiency. Maintaining the hygienic integrity of the uterus is an important factor influencing success. Little things like clean hands, clean paper towels, clean equipment and perhaps double sheath breeding may make a meaningful difference in the long run.

### THE ENVIRONMENT

Environment is the overwhelming factor influencing conception potential. Heat stress is one of the most obvious environmental culprits. Facility design and strategic use of fans and sprinklers are essential to maintain acceptable conception rates through the warm summer months. Cool, clean water must be provided in all locations, especially in holding pens.

Environmental disease exposure can dramatically impact reproductive performance. Many herds have found out the hard way that vaccination programs are insurance policies but by no means are they guarantees. Work with your veterinarian to establish a routine herd health program. Vaccination must be combined with close surveillance and disease testing as necessary. Testing is especially important for deaths and abortions. The potential for persistently infected Bovine Viral



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Diarrhea Virus (BVDV) animals to enter the herd should constantly be on the radar screen of every herd. A facility to isolate new animals and (or) diseased animals from the rest of the herd is critical. Controlling exposure of cattle to wildlife and some domestic species can decrease the opportunity for disease exposure. Deer, raccoons, and canines are among a few in particular that should be controlled and restricted from cows to the extent possible.

Nutrition not only affects the cow in terms of energy balance and body condition, but also in terms of immune function. A sound nutrition program may better support a cow's natural defense mechanisms even in the face of high disease exposure. In contrast, a poor nutrition program may compromise herd immunity to the point that disease outbreaks could occur in situations of otherwise relatively low levels of exposure.

Feedstuffs also serve as a potential source of toxins. Cottonseed products with high levels of gossypol can negatively affect reproduction. Mycotoxins are a constant environmental threat and the effects can range from subtle to quite extreme. It is often difficult to distinguish direct from indirect effects of toxins that may be due to reduced dry matter intake. As producers explore alternative feed sources and by-products in efforts to control rising feed costs, nutrition will likely continue to remain at the forefront of environmental challenges to optimum reproductive performance.

Cow comfort is another important environmental component of the fertility equation. Cows definitely need to be comfortable at the feed bunk and shade, fans, and sprinklers are extremely valuable to this end. Pay close attention to stall size and frequency of bedding. In dry lots, provide packs and adequate drainage. Concrete alleys should be grooved to avoid slippage and free of rocks to avoid hoof injury. Rubber mats should be considered when possible.



During hot, humid weather, fans and sprinklers provide added cow comfort.



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Growing evidence implicates mastitis as being associated with reduced reproductive performance. It's not clear whether mastitis directly affects reproduction or is simply a barometer of herd health and immune competence. In either case, managing the cow's environment to reduce mastitis in the herd will also tend to improve reproductive performance in the herd.

### SUMMARY

It is easy to list 60 to 80 different factors that can affect the success of a given insemination, many of which occurred months prior to the insemination date. Successful managers recognize each day must be used to prepare cows for tomorrow's fertility. The easiest part of the fertility chain to control is semen quality. Purchase semen only from reputable CSS approved suppliers and assure that technicians are adequately trained. The heat detection program must minimize the number of cows presented for A.I. at the wrong time or that are not in estrus. Work with your veterinarian, nutritionist and Select Sires Reproductive Solutions™ Specialist to establish a comprehensive reproductive herd management program that ensures all pieces of the fertility puzzle fit into place. ♦



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